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TABLE OF CONTENTS

Automobile Shops, Lane Technical High School, Chicago, Ill. Cover
Planer Equipment.....Supplement
Herbert D. Harper
The Shop Objectives and the Physical Equipment for Home Mechanics Departments of Continuation Schools.....163
Wm. F. Rasche
Industrial Arts at San Antonio, Texas.....166
Victor J. Smith
The Problem of the Try-Out Courses.....168
Arthur F. Payne
The General Shop as a Junior High School Activity.....171
Denman Kelley
Organization and Teaching of Sheet Metal Work in the Junior High School.....174
Frank A. Schneider
Trapping the Quick Brown Fox.....177
Frederick Ames Coates
Industrial Science in the Shops.....178
Percy E. Rowell
Britannia Metal—XII—Color and the Britannia Lighting Unit.181
Wm. H. Varnum
Minimum Equipment for Elementary Machine Shop Practice..185
G. H. Snaddon
Junior High School Woodworking.....186
Wm. V. Winslow
Little Arguments on Great Principles—Words Versus Deeds..187
Editorial.....188

PROBLEMS AND PROJECTS:

A Job Sheet for the Home Mechanics or Woodworking Shops...190
F. E. Tustison
Hanging Basket for Plant Made from Cocoanut Shell.....191
R. A. Pottsmith
A Crystal Set.....192
Arthur O. Gardner
Radio Cabinet.....192
Geo. C. Wichmann
A Practical System for Using Magazine Drawings.....193
Kenneth R. LaVoy
An Ideal Group Project.....194
Chas. B. Woodstock
Tool Distribution in the School Shop.....195
H. D. Smith
Perspective Drawing—II.....197
V. L. Sherman
A Course in Elementary Cabinet Making.....197
J. A. Shelly
Boat Building in Los Angeles.....198
Vocational Education Society of Boston.....199
New York School Crafts Club.....199
"WBBW"—A Junior High School Project in Radio Broadcasting.....200
S. M. Klinefelter
The Western Arts Convention Program.....201
Pittsburgh Industrial Arts Meeting.....201
Now, Are There Any Questions?.....202
New Books.....24a
News and Notes from the Field.....26a
Personal News Notes.....28a
A Cross-Word Puzzle of Technical Terms.....30a
W. M. Walter
New Trade Products.....32a

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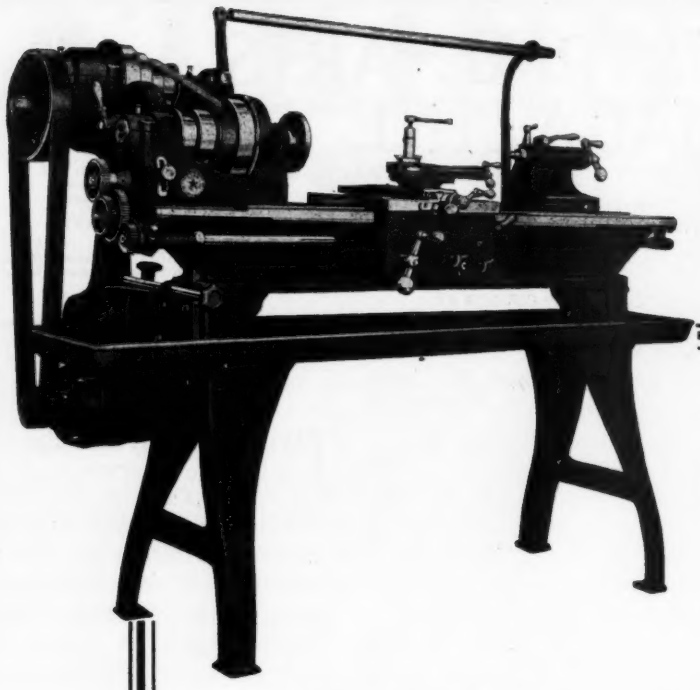

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THE INDUSTRIAL ARTS MAGAZINE

Volume XIV MAY, 1925 No. 5

The Shop Objectives and the Physical Equipment for Home Mechanics Departments of Continuation Schools

William F. Rasche, Division of Vocational Teacher Training, Milwaukee Vocational School.

THE HOME mechanics movement has gained nation-wide favor because it meets a real need. Detroit, Milwaukee, New Orleans, Rochester, and other cities are among the larger places where very definite and excellent instructional programs in home mechanics have been developed. The progress that has been made is appreciable and measurable. In the light of the present popularity and success of the work, it may be interesting to review briefly and in passing a few of the things that motivated some of the men who were among the pioneers that launched the movement.

At the Stout Institute, Mr. George F. Buxton, then director of the industrial-arts department, and Mr. Fred L. Curran, in charge of practice teachers, organized in 1911 the first course offered there. The name given to the course was "Special Shop Work" of which one-third covered problems in "Home Repair." The work was given that year to the seventh grade pupils in the Menomonie public schools and was also part of the practical instruction given to the Stout Institute students. The objectives of the course were to introduce into the schools a new type of practical work based on home needs and to train the Stout Institute students to teach home repair in the schools to which they might be appointed as teachers. The Institute has today a well planned course in home mechanics which has been developed by Mr. F. E. Tustison under the direction of Mr. Clyde A. Bowman, director of the industrial-arts department.

At Milwaukee was organized the first American continuation school class in home mechanics. Director R. L. Cooley and Principal W. C. Sieker felt when they opened this school that home problems had a place in continuation school curricula. In those days the term "home mechanics" was not used as it is today. Instead the shop phase of the course was termed "the general utility course" and included the ordinary home repair jobs such as soldering, wood tool work, finishing, glazing, and the repairing of faucets, traps, and bells.

The Milwaukee objective was not, however, the mere teaching of these practical jobs. Mr. Cooley from the beginning has held to a broader purpose. He has stressed frequently that "society cannot afford to increase the number of its bankrupt homes" and that one of the functions of any part-time school is to prepare its pupils "to establish solvent homes." For that reason the outline of instruction must include other things pertinent to home life. It must deal with the economic and legal phases of home life as well. Not only must the boy be taught how to keep a home in repair, but also how to come into possession of one, how to determine by what legal processes he can establish title to it, and to know what are his legal obligations with respect to it after he has established it.

The course as offered in the Milwaukee Vocational School (continuation schools in Wisconsin are designated by law as vocational schools) is still called the "home mechanics course." This name, however, is not entirely satisfactory, because it signifies a narrower purpose than the one mapped out for the home mechanics department. It is narrow even for the purely shop objectives treated under the next heading of this article. It is timely that consideration be given to the selection of a more comprehensive term.

The Objectives for the Practical Work

The home mechanics shops of the part-time school can very well be made to serve three important purposes. If the work is offered to beginning boys between the ages of fourteen and sixteen years, the home mechanics instruction can be undertaken with the assurance that its greatest possibilities can be developed. A well organized outline of instruction for such pupils will be planned more effectively, if the following major objectives are kept clearly in mind:

1. To adjust the boy to his new school and to his employment.
2. To give the boy an understanding of practical home jobs and skill in the doing of them.
3. To diagnose the boy's personal qualifications with a view of helping him make satisfactory preparation for some useful occupation.

The Shop Teacher

The statement of the objectives in the preceding paragraph indicates that the teachers who control home mechanics shops of the type mentioned must possess qualifications other than those necessary for shop instruction only. These teachers must be, in addition, boy leaders and character analysts. It is required of them to make the new boy feel welcome to the part-time school; to encourage him to bring his problems to the teacher when the boy needs counsel and advice; to de-

termine the boy's qualifications of health, industry, attitude, courtesy, initiative, reliability, cooperation, and personality; to discover the special talents and skills which the boy may have and to advise the boy as to the suitability of his choice of an occupation.

Such qualifications are premised on the supposition that the teacher is trained to do the practical shop work in an efficient manner, on an interest of a very helpful kind in juvenile workers, on a knowledge of human characteristics, and on the possession of a keen judgment of aptitudes and skills.

This type of teacher holds a key position. Quite apart from the qualifications already listed, he must be an unusually good organizer. He is required to set standards. Through him the new pupil gets his first impressions of the school. The presence of a neat, well appearing instructor, friendly in his ways, firm in his discipline, precise in his executon of shop work, prompt in his movements, businesslike in the performance of every duty, and well informed about the general school policy and the occupational conditions in the local community will influence the new boy favorably.

The Principle of Scientific Management

The business world has approved the principle of scientific management. Commercial and industrial organizations have appreciated the gains that come from the scientific administration of great business enterprises. The successful methods of business organization, especially on the manufacturing side, may successfully be carried over into the vocational schools. Those responsible for the organization of school shops and outlines of instruction will do well to set their objectives down very specifically and then organize their shops, outlines, and procedures in accordance with these objectives.

Scientific management in industry seeks to eliminate waste of time, material, and resources; endeavors to equip shops with the proper machines, tools, and general equipment to the end that with a minimum of effort, a maximum of speed, and an insurance of quality, goods may be produced with the least danger and fatigue for the worker and the greatest profit for the employer. Such management entails time studies, operation studies, proper routing of materials and work in process, the study of operatives and other employes, and the organization of planning and supervision departments to carry out the general scheme.

Scientific planning applied to the operation of vocational school shops must meet the difficulties suggested by the seven following sets of questions:

1. What is the purpose of the shop work? Has it one or more clearly defined objectives? What relation have these objectives to the general school objectives?

2. What is the better plan to follow in the matter of providing equipment? Does true economy demand that the first equipment installation for a permanent shop be highly efficient, durable, boy-proof, and production-proof, even though the first cost be somewhat higher, or that second-hand, discarded, cheap, and lighter equipment of the same general kind be purchased?

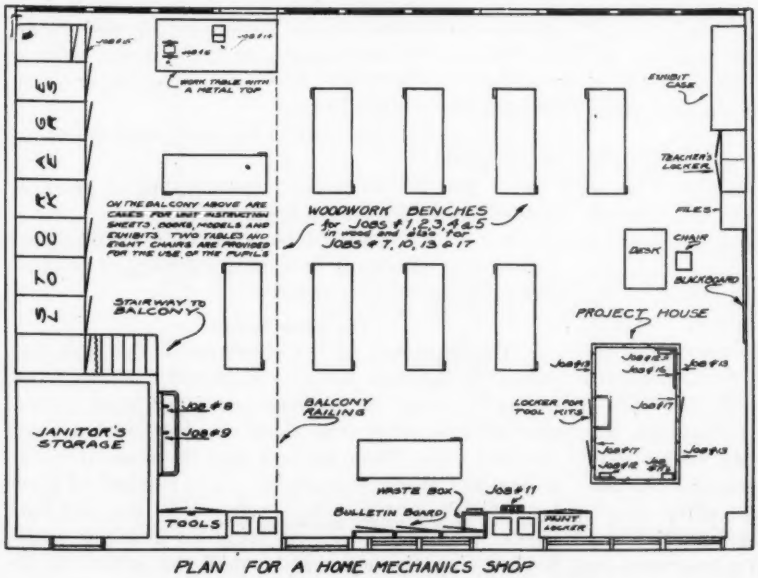
3. What must be kept in mind in the matter of arranging equipment and assigning work to give the instructor in command of the shop the best means for accomplishing the school and shop objectives under conditions most satisfactory for himself? In other words, how can a shop be planned so the administration of the shop will not waste the time, energy, and efforts of the teacher?

4. What plan of shop organization, external with relation to the school administration and internal with reference to the management by the instructor, will insure a maximum of good for the pupils? Can administrative methods for taking care of details be devised to prevent frequent and annoying interruptions of the classwork of the pupils? Can a procedure be worked out that will insure the progress of pupils through an efficient organization of instruction, routing, and checking by the teacher?

5. What system will entail a minimum of expense in the satisfactory maintenance of shops? Should an instructor be a business manager concerned with the problems of cost as well as a teacher concerned with instruction?

6. What may be done to get the most satisfactory coordination between this shop and other shops in the school which in any way may have business of one kind or another in common?

7. How can the executive officers of the school be accommodated when they must make provision for heavy enrollments at times when additional shops and teachers are not immediately available?


WORK TABLE WITH A METAL TOP
ON THE BALCONY ABOVE ARE CASES FOR UNIT INSTRUCTION SHEETS, BOOKS, MODELS AND EXHIBITS. TWO TABLES AND STUNT CHAIRS ARE PROVIDED FOR THE USE OF THE PUPILS
WOODWORK BENCHES for JOBS # 1, 2, 3, 4 & 5 in wood and also for JOBS # 7, 10, 13 & 17
EXHIBIT CASE
TEACHER'S LOCKER
FILES
DESK
CHAIR
BLACKBOARD
PROJECT HOUSE
STAIRWAY TO BALCONY
JANITOR'S STORAGE
JOB # 8
JOB # 9
BALCONY RAILING
LOCKER FOR TOOL KITS
JOB # 11
WASTE BOX
BULLETIN BOARD
PAINT LOCKER
TOOLS

PLAN FOR A HOME MECHANICS SHOP

FIGURE 1. FLOOR PLAN OF A HOME MECHANICS SHOP.

The solution of such problems is not entirely easy. It is a difficult matter in large schools which serve metropolitan populations to effect the proper reconciliation of all the aims stated. It is especially hard at times to give a teacher a proper teaching load, the pupils efficient instruction, and the administrator a place for all incoming pupils. Only by scientific planning of the objectives, outlines of instruction, shop equipment, shop layouts, and instructional material can success be attained in meeting difficult situations of this kind.

The Practical Work Objective

The following paragraphs treat of the general plan that has been developed in the Milwaukee Vocational School to carry out the seven principles stated above with reference to the physical arrangement and equipment of the work shops in the Home Mechanics Department. They do not include any treatment of the general subject phases.

All boys under sixteen years of age pass through this department and stay there for a period of four to five months. For them it is an experience in practical work in home jobs, and for the school it is an opportunity to study the boys and help adjust them to suitable employment and to the proper kind of instruction following their discharge from the department. While they are in the department, the boys spend one-half of their time, or four hours per week, in the shops. The other half of each school day is devoted to the general subjects in special rooms where they work on units of instruction which develop their knowledge of personal business problems, of science related to the practical work, of the problems of earning a livelihood, the history, civics, and geography of Milwaukee, and the problems of personal adjustment as applied to their school life and employment.

The shop arrangements described in this article have been tested out in actual practice. Five shops have been used continuously to take care of heavy enrollments which have been as high as fifteen hundred new pupils per year. The test has been sufficiently severe to prove up weaknesses in shop organization and to force changes that have resulted in more efficient equipment, organization, and administration.

The Outline of Instruction

An analysis of the home mechanics field gives the planner a large range of practical home jobs from which to select. His selections will depend in large measure upon space and equipment available and the time allotment for the instruction. Of these two limitations the second only presents any real restrictions. Time is important because it should be conserved to the boy's greatest good. Hence, a satisfactory principle is to map out an outline of instruction which, when administered, will give the boy the skills to be acquired, adjust the boy to his work and to the school, and permit the making of an intelligent diagnosis by the boy's instructor. Experience shows that this can be done in a period of four to five part-time school months, or in sixteen to twenty eight-hour days of actual attendance.

Such a length of time is long enough to give opportunity for the training and the acquisition of skill in enough of the more common home jobs to make the instruction actually worth while. Though this program is selective rather than exhaustive, it accomplishes for the institution the three purposes outlined. The period allotted is just long enough to adjust the boy to the school. By the time he becomes acquainted, he is ready to move on to a testing department in the school, where he can test out his choice of an occupation. The instructor is afforded ample opportunity during this period to know and to understand the boy so he may advise him properly.

Out of much good material available the following outline of instruction was selected:

Practical Jobs Offered

1. The Construction of a Pantry Rack.
2. The Construction of a Tool Tray.
3. The Construction of a Flower Box.
4. The Construction of a Step Ladder.
5. The Construction of an Auto Creeper.
   (One of the five woodwork jobs only is required, or in lieu thereof, one designed by the boy and approved by his instructor. Jobs 6 to 20 inclusive are all required.)
6. Tool Checking and Sharpening.
7. Painting and Staining.
8. Compression Faucet Repairs.
9. Fuller Faucet Repairs.
10. Electric Extension Cords.
11. Electric Fuses.
12. Bell and Buzzer Connections.
13. Glazing.
14. Soldering.
15. The Fitting of a Door Lock and Hinge.
16. Wall Patching.
17. Resetting Door Strikes.
18. Home Project Assignments.
19. Report Checking.
20. Foreman Training.

The Plan of the Shop Organization

Class instruction is impossible in a shop of the type to be described because the shop groups are likely to vary from week to week. New boys arrive and others leave quite frequently. On this account individual assignments are the basis for the operation of the work. Each boy is considered a unit by himself, whose progress is dependent upon his own effort, speed, and skill. He is neither retarded nor advanced by the movement of other boys, for he is permitted to progress at the fastest speed rate of which he is capable.

Since the outline of work is fixed, a sequence of demonstrations is established. These are continuous and start over again whenever a cycle has been completed. A pupil is never permitted to work on a practical job until he has seen it demonstrated, nor does he take jobs in any given numerical order. If he arrives in the middle of a cycle, he begins there, much on the order that a person sees a picture at a movie if he comes late. He starts at that point and works through the cycle to the end and then takes up the part of the work he missed because of his late arrival. This arrangement for assigning jobs has proved efficient because each job is complete in itself and has nothing in common with any of the other jobs. By this plan the instructor can keep boys employed on all the units, and can teach with a minimum amount of effort on direct instruction and demonstration.

Two practical devices facilitate this plan of operation. First, the shop is equipped on the general shop plan, and second, the pupils work directly from unit instruction sheets. The general shop organization accommodates a varied program of activities and the unit instruction sheets place a maximum of responsibility upon the pupil, direct and guide his effort, and lighten the load of formal instruction for the teacher.

The Shop Equipment

The equipment for each home mechanics shop in the Milwaukee Vocational School was planned for a maximum class enrollment of 22 boys. Reference to the outline of twenty units of instruction will make clear that the principle has been maintained that twenty boys at

practical work is a right teaching load for a shop teacher. Units 19 and 20 call for work of a supervisory character which is done during each shop session by two of the 22 boys. The work these two boys do as report checkers and foremen lightens the teacher's task rather than increases it. Likewise, the teacher is afforded additional opportunity to study the traits and characteristics of his pupils with respect to their managerial ability. In five shops twenty additional boys are accommodated per session, or two hundred per year. Thus an investment in an extra shop has been saved the city.

The equipment provided for these shop teachers consists of the following items:

One project house.
Ten woodwork benches.
One general tool locker and tools.
One fireproof paint supply locker.
One soldering and tool sharpening table.
One sink with compression and Fuller faucets.
One battery of storage lockers.
One exhibit case.
One teacher's desk and a chair.
One teacher's file.
One balcony with a storage cabinet for unit instruction sheets, teaching models, and reference books.
Two writing tables for pupils.
Eight chairs for pupils.
One bulletin case.
One set of progress boards and pegs.

The Use of the Equipment

The accompanying floor plan gives the position of each item of equipment. Ten woodwork benches are included. Since two boys can use one bench, twenty boys can be assigned job units on wood. Twenty boys are so assigned by the instructor when a new group reports for instruction on the first day of the school term.

On succeeding days some of the boys are assigned to other units. The remaining boys continue on woodwork since most woodwork jobs run through several shop periods. On these days the instructor demonstrates those units other than woodwork that will draw off the greatest number of pupils from the benches to the equipment for the other mechanical jobs. Those which are for but one pupil are demonstrated later. By this sequence of demonstrations the teacher is able to give each pupil work and to use all of the equipment. There is no need for more than one grinder, one soldering furnace, one door for lock work, one sink for faucet work, or one fuse box for fuse work. The work benches require little or no care from the teacher because they are very simply constructed. This plan keeps down the amount of equipment to be cared for by the instructor. It also keeps equipment costs low.

(NOTE—The second part of this article will contain detailed descriptions and illustrations of the interesting equipment developed for teaching home mechanics.)

Industrial Arts at San Antonio, Texas

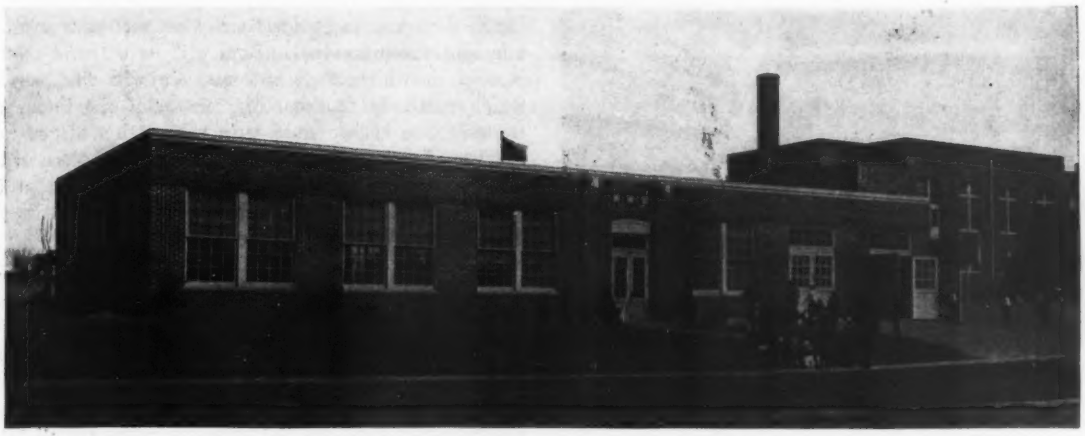
Victor J. Smith, Alpine, Texas.

SOME TIME ago Dr. C. H. Judd, of the University of Chicago, examined the San Antonio educational program. After completing his study San Antonio undertook in 1923 one of the most complete reorganizations which has ever been undertaken in an American city." The plan referred to contemplated a 5-3-3 system and included the construction of fourteen new buildings, eight of which were to be junior high schools. After a personal examination of the now practically completed reorganization, Dr. Thomas H. Briggs, of Columbia University, declared that the San Antonio school plant more nearly approached what he considered an ideal junior high school group than any other system which has come under his observation. With these and similar expressions coming from authorities in educational matters, a short survey of what has been accomplished in the industrial arts should be of interest to those in the field.

Except where necessary to meet special conditions, the group of junior high schools is fairly uniform as to buildings, equipments, and general plan. The shops are approximately 45′ x 100′ in size and are well heated

WOODWORKING SHOP AT THE SIDNEY LANIER JUNIOR HIGH SCHOOL. B. C. Vincentini, Instructor.
Shop used one-half day for Smith-Hughes class in Carpentry and Millwork, and one-half day for Pre-Vocational Woodwork. Picture shows vocational group. The Sidney Lanier Junior High School is practically one hundred per cent Mexican in population.

AUTO TRIM SHOP AT THE SIDNEY LANIER JUNIOR HIGH SCHOOL, SAN ANTONIO, TEXAS. C. W. Cameron, Instructor.
Shop is used one-half day for a Smith-Hughes class in Auto Trim and Painting, and one-half day Pre-Vocational in the same subject. The class shown in this picture is the vocational group. The school has practically one hundred per cent Mexican population.



SMALL BUILDING IN FOREGROUND—INDUSTRIAL ARTS BUILDING AT THE MARK TWAIN JUNIOR HIGH SCHOOL, SAN ANTONIO, TEXAS.

VIEW AT WOODWORKING END OF GENERAL SHOP AT THE MARK TWAIN JUNIOR HIGH SCHOOL, SAN ANTONIO, TEXAS. F. E. Joas, Instructor.

METALWORKING END OF GENERAL SHOP, MARK TWAIN JUNIOR HIGH SCHOOL, SAN ANTONIO, TEXAS. R. H. Perry and E. D. Anderson, Instructors.

and lighted. They are located conveniently to the main buildings and yet retain all the advantages of independent units. The floors are of composition material which combines the advantages of both wood and concrete, without the objections of either. In every detail the shops are adapted to the work for which they were intended. In general, the fields of metalworking and woodworking occupy halves of the building, each under a separate teacher—both a team.

During the first year of junior high school, all boys enroll for two thirty minute periods of industrial arts each week. This introduces the student to the general shop activities: concrete and woodwork, with related finishing and turning; and sheetmetal, electrical and

EXTERIOR VIEW OF THE INDUSTRIAL BUILDING AT THE SIDNEY LANIER JUNIOR HIGH SCHOOL, SAN ANTONIO, TEXAS.

SMITH-HUGHES VOCATIONAL EVENING SCHOOL CLASS IN OXY-ACETYLENE WELDING. C. P. Williams, Instructor.

automotive work, plus the necessary forging and simple machine work. Some of the schools include printing and all use drafting, not as a subject in itself, but as a necessary and useful parallel to the shop activities.

After this first year, the work is elective and more time is allowed. In the choice of actual projects undertaken, the work is so arranged that the boy, spending alternate half years in either shop, undertakes work which may be termed "boy activity interest" projects. Home service and household mechanics form another group, and school service units make up a third. It is impossible to discuss or even list here all of the guidance and educational motives which the system holds constantly in mind as important parts of the objectives of shop work.

If the boy continues his industrial interests in the senior high school, he may choose between two courses. One of these is a strong course in the usual senior mechanic arts subjects, of which architecture and machine drawing are important units. Completely equipped shops are available for continuing the work started in the lower grades. The other option lies in the Smith-Hughes classes, day trade courses or part time work as may suit the individual. Boys who have found the direction in which their interests lie will find courses which will help fit them for certain of the important trades. One is impressed with the cutting of red tape and the effort to fit each individual into the place in the system which will yield the greatest good to that individual. Night schools add to the opportunities for continued instruction and study.

An example of suiting the school system to community needs is best found in the Sidney Lanier school. This school has an exclusively Mexican student body. The shops, however, are the most extensively and completely equipped of the entire junior high school system. Machine shop, auto mechanics, printing, sheetmetal, woodworking, auto top and finishing rooms are all fitted with modern equipment and placed in an ideally arranged building. This school has a complete shop which is a real demonstration of a program leading to the vocational and civic usefulness of its students. The Douglas School for negroes is a model of its type as well.

As one sees the industrial arts situation in San Antonio, two outstanding forces will probably be observed as reasons for the results obtained. One of these is Supervisor L. W. Fox with his close study, good ideas, and enthusiasm; and the other lies in the splendidly equipped, loyal, and unified group of special teachers. These people did not hesitate to plunge into a drastic reorganization program, while other cities hesitated and wondered what the next step in industrial arts might be. It is small wonder that San Antonio is drawing educational investigators from all parts of the United States and that the industrial education units of the system are constantly receiving favorable comment—the result of an understanding of the values sought and of objectives clearly and specifically set up.

The Problem of the Try-Out Courses

Arthur F. Payne, Teachers College, Columbia University.

THE literature of vocational guidance in junior high schools is besprinkled with proposals for the establishment of try-out courses, and pronouncements of their great values in enabling young people to discover the occupation for which they are best fitted.

In our junior high schools it is customary to label the special courses for boys, otherwise known as industrial arts courses, as try-out courses. Strangely enough, we have not labeled any courses offered for girls in the same way. If we are to accept the present situation as indicative of our idea of what constitutes a real try-out for a vocation, we must admit that schoolmen have a very naive conception of actual conditions in industry and business. In fact, we do not see how it is possible for professional educators to take their own published statements seriously in this matter.

It is not our purpose to depreciate the value, or the advisability, of having shop work of the industrial-arts type in junior high schools. Perhaps we need much more of it. It should be very much better organized. We need better equipment, better courses, better teachers, more definite objectives. The industrial-arts shop work is one of the many fine things in the junior high school organization. We are fairly certain of the general educational, cultural and "consumer" values of this kind of work, at least as certain as we are of the values of other junior high school subjects.

A great deal has been said and written concerning the important values of these industrial-arts shop courses as try-out courses for the vocation. It is this question that we wish to consider at this time. Unfortunately, the claims of great try-out values have quite generally been accepted at their face value. Our present thesis is that these extremely limited offerings of the industrial arts shops, in even the best of our junior high schools, do not in any kind of fashion, constitute real try-out courses for any vocations. Even the negative value of such courses is extremely limited.

How is it possible, for instance, in New York City with its 17,000 different occupations, 207 of which are taught in the public schools of the city as evidenced by the fact that they offer 207 different examinations and licenses for teachers of specific vocational subjects; also,

that there are no less than 500 different specific vocations taught in the public and private schools of the country, to really take ourselves seriously about the try-out values of industrial-arts courses in the junior high schools when there are only eight kinds of these so-called try-out courses in all the junior high schools of the city?

If such industrial-arts courses are set up for their educational values, that is one matter; but, when they are set up for their try-out values, that is an entirely different matter.

In the face of the present situation in industry and business, with its great diversity and increasing specialization, it would be just about as sensible for us to claim try-out values for a course of study in the geography of Africa or China, or in the language of Sweden or Austria, because maybe the students might sometime in their life, have to go, or want to go, to South Africa or Austria. The only value claimed for such courses is their general educationl value. It at once appears absurd to claim try-out values for such courses, but it is no more absurd than claiming try-out values for our industrial-arts shop courses as organized and conducted at the present time.

It seems that our whole industrial-arts program of the junior high school, from the standpoint of try-out values, is based upon the very naive assumption that the economic activities of our highly organized, localized, machinized, and specialized industrial and commercial civilization are limited to very elementary bench work in wood, a little wood turning, the making of cups and dust pans out of tin, elementary electric wiring degenerating into radio, a little machine-shop work and printing by hand processes.

If we insist upon claiming specific try-out values for these courses we must be prepared to answer many questions. Some of these are:

1. On the basis of what data was the choice of the try-out course made for the individual? For the school? For the community?

2. How long does it take to try-out for the vocation of machinist? For draftsman? For tinsmith? For baker? For electrician? For tailor? For painter? In what manner was this length of time determined?

3. What is meant by the term machinist? Do you mean a tool maker or a J. & L. automatic operator? Both call themselves machinists, and yet there is a very great difference between them. What do you mean by a draftsman? A draftsman in an architect's office, or a draftsman in a master mechanic's office? Do you mean a draftsman who merely carries out the instructions and ideas of a designer, or one supposed to create ideas or solve problems himself? What do you mean by a pattern-maker? Do you mean a pattern-maker who makes wooden patterns for machines, or a pattern-maker who makes wax patterns for jewelry and art work, or a pattern-maker who makes patterns in aluminum and other metals for stove workers? Or do you mean a pattern-maker for tinsmithing or a pattern-maker who makes templets for ship building plants or a pattern-maker who makes templets for frogs and switches and crossovers in a railroad shop, or pattern-makers for the silverware industry, pattern-makers in clothing establishments? All of these are pattern-makers. Yet our so-called try-out courses in pattern-making are limited to one type.

4. Let us consider the individuals. How long does it take certain case groups or individuals to try-out for certain vocations? Case groups of individuals or individuals with an I. Q. of 70? 90? 110? Certain case groups, or individuals with discovered aptitudes for mechanic work, and others with discovered aptitudes for clerical work.

5. For what levels in a particular vocation are we trying out, the entrance level only, that is, where the individual just barely enters a vocation specialty and holds on for dear life, or where the individual is to make progress in the vocation and eventually reach the journeyman ranking, or are we trying out for the "non-commisioned officer in industry" level or for the sub-executive level?

6. What percentage of the graduates of these so-called try-out courses have actually chosen, trained for, entered upon and made progress in one of these vocations? Has any research been done along this line? If so, who made it, where is it, and what were the results?

7. Are the conditions of the industrial arts shops, the requirements of the work, the equipment, the methods of working, the standards of quality and quantity, the hours, the fellow-workers, etc., so similar to the actual working conditions in the vocation or on the job, as to justify us in claiming that it constitutes a real try-out or actual sampling of the job. If so, how were these actual job-work conditions ascertained? Who ascertained them? Where are they filed?

8. Do the students in these so-called try-out courses really understand and appreciate the purposes of the procedures? Do they know just what they are doing? Do they know what is being done for them or to them?

9. Do the students who do not take try-out courses decide upon, enter and make progress in vocations, equally as well as those who do take our try-out courses?

10. What percentage of the teachers of these industrial try-out courses have had real experience in the practice of the vocations they are conducting try-outs for? What are their standards for a successful try-out? On what are these standards based; course requirements or trade conditions?

If we would only make a study of the activities whereby the alumni of our junior high schools or people generally earn a living, and then turn around and look at the socalled try-out courses in our junior high schools, we would quite readily see upon what a weak foundation is the generally accepted claim for try-out values in these industrial arts courses based. We have not even recognized in our organization of them the three great divisions of economic activity as follows: (1) Production activities; (2) distribution activities; (3) service activities; we have only recognized the production activities and even in that field only in an extremely limited and futile sort of fashion.

Our present plea is for a much wider conception of the try-out idea and a much more vigorous organization of try-out courses in our public schools. We would like to see retained and very much expanded, developed and improved, the present socalled try-out courses in indus-

trial arts shops. In addition, why should we not have real try-out courses based on job analyses in the fields of commercial education, cultural education, in the fine and applied arts, such as free hand drawing, mechanical drawing, applied design, music? Why not have try-out courses for college entrance, try-out courses for senior high school, try-out courses in the foreign languages, in mathematics, in chemistry, in physics, in household arts, in literature?

It is a well-known fact that a large proportion of our junior and senior high school students are employed at some form of remunerative work outside of school hours. In many cases, the work is performed solely for its financial reward and has unknown try-out values. Why should it not be a function of the junior high school through its vocational guidance advisor to arrange, classify and evaluate the particulars of this type of employment, organize them, and place students in them as part of a general scheme of try-outs?

Why should not try-out courses function in part-time employment, during vacation times, after school hours, on Saturday mornings? Let us break down the restricting walls of the schools and have try-out courses in the community. Let them make their try-outs on the job itself instead of holding it to a little futile woodwork done in the basement of the school building.

At about the age of 13 or 14 for the normal student practically all of his school work should be conceived as try-outs for a period of at least two years, or until his line of future education and activity has been more definitely settled.

Why could we not conceive all extra-curricula activities in terms of their try-out values? Why should they not be recognized in terms of their selective and educative values? Why should we not take such a list as the 128 different extra-curricula activities of the New York City schools and reclassify them on the following basis: (1) Literary, (2) linguistic, (3) mathematical, (4) manipulative, (5) social, (6) esthetic, and use these activities as a type of try-out?

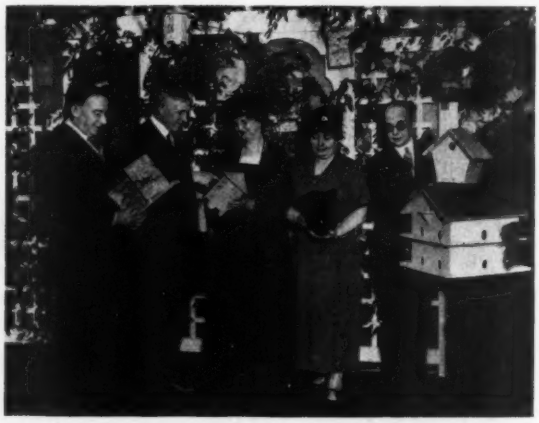
New York City has 34 high schools with a total enrollment of about 120,000; yet, it is a well-known fact that they lose nearly one-half of their entire freshman enrollment during the first year, and about two-fifths of the remaining sophomores before the end of the second school year. Could we not save much of this waste by establishing try-out courses for the highly formalized requirements of the general high schools, or for the various types of high schools as of courses found in our high schools?

Would not both the students and the schools be much better off, if a thorough-going analysis and diagnosis of each student were made a part of the guidance system of every junior high school? Let us keep a complete, accurate, detailed record of all phases of the student's life in so far as it is ascertainable. Let us use tests where they have something of benefit to offer, and then let us finally write a tentative prescription for these students, testing our prescription by try-outs of various kinds.

In New York City there are try-out courses for cabinet-makers when the 1920 census shows that there are only 3775 cabinet-makers in the city. We have no try-out courses for bakers who total 15,759. We have try-out courses for pattern-makers although there are only 848, and even that group on analysis would break up into about six different kinds of pattern-making. We have 2,608 engravers but no try-out courses for them. We have try-out courses for the electricians who number 18,987 but no try-out courses for the painters who number 81,523. The machinists, socalled, have try-out courses though they number 39,723, but the tailors do not have any even though they number 130,386. Every junior high school has a try-out course in printing even though the printers number only 30,950 and the printing shops are leaving New York City steadily. The clothing industry, one of New York's greatest industries, has no try-out courses for its 271,364 workers. The 3,928 draftsmen have try-out courses but the 269,267 salesmen have none. The plumbers number 19,354 and have try-out courses in some junior high schools, but the 26,383 shoemakers have none.

In regard to the so-called try-out courses, we fear that we are still in that stage where all we can say is *"I believe* this is so," but I cannot prove it. We need particularly in this field more of the sharp scientific thinking which is now coming into all branches of educaton, where we can take the scientific attitude of *"I know* this to be so, here is the evidence." We must admit that so far as these try-out values are concerned, they are almost entirely on the basis of faith, hope, and charity. We have faith and hope that they will function as try-out courses, and then we ask a charitable treatment if they do not.

It seems that we can no longer dodge the issue of try-outs to test tentative guidance prescriptions. We must have them and they must be real. It is only by having the courage to face the facts, make analyses and establish sharp objectives based on these analyses, that we can hope to make progress in this particular phase of education.



A BIRD HOUSE SCHOOL BOARD MEETING.

A recent meeting of the Chicago Board of Education was held in its administration building where a pupils' bird house exhibit was staged by Edward F. Worst, director of elementary manual training. Members of the board, left to right: Hart Hanson, William K. Fellows, Mrs. David Gregg, Mrs. William Hefferan, and J. Lewis Coath.

The General Shop as a Junior High School Activity

Denman Kelley, Assistant Professor of Industrial Arts, Indiana State Normal School, Terre Haute, Indiana.

I. Introductory

One of the most important as well as the most difficult tasks arising in any system of education is the construction of a curriculum. This is true because the objectives of education are continually changing to meet changing social needs. Added to this difficulty is the ultra-conservative tendency of human beings to feel that when a plan of action has once been evolved and put into operation that the question is settled once and for all. These "traditionists" violently and continually oppose any change in the established curriculum no matter how great the needs of society are for such a change.

Our society today is largely industrial and is becoming more so with such rapidity that we can scarcely begin to foresee the conditions a few years hence. This rapid change to an industrial society is bringing about momentous changes in our social organization both as to objectives and means of realizing them The junior high school movement now gaining such headway is a good example of one way in which this change is taking place in the field of education. The demand of society which in spite of the opposition of many schoolmen caused the passage of the Federal Vocational Act and the resulting growth of vocational education is another illustration of this change in education.

The latest child which has been born into the educational family has been christened General Shop, and the infant is just now at the stage when he is making much noice and disturbing the peace of a good many of his neighbors.

To understand the significance of the general shop movement one must make a study of the objectives of secondary education. One of the best statements of these objectives was given in Bulletin No. 35, 1918, published by the Bureau of Education and entitled "Cardinal Principles of Secondary Education." They were 1, command of the fundamental processes; 2, health; 3, the development of ethical character; 4, worthy home membership; 5, worthy use of leisure time; 6, citizenship; 7, vocations.

In his book on the junior high school Koos gives the following functions of education for youths of this period: 1, Exploration and guidance; 2, retention of pupils; 3, economy of time; 4, recognition of and provision for individual differences; 5, to provide better teaching; 6, special provision for adolescent pupils; 7, better articulation with high school work.

In this discussion we are interested in discovering which of these aims industrial arts can realize as an educational process and we are particularly interested in discovering whether the general shop plan will realize these aims more effectively than the older plans.

When we trace thru the history of industrial arts we find that it started with the Russian system of tool instruction which was mainly on the exercise basis. This was somewhat modified by Swedish Sloyd at the very beginning in the United States. Both systems were essentially vocational in their objectives when introduced in their native lands, but almost from the very beginning the aim has been pedagogical rather than vocational in this country.

With the demand for vocational education coming from employers and workmen and culminating in the Federal Vocational Act, industrial arts or prevocational education has begun to evolve a new and broader set of aims. It is mainly for this reason that school men have begun to be dissatisfied with the traditional type of industrial arts and to demand something which for want of a better name they have called General Shop.

II. What General Shop Is

A. Sources of Definitions of General Shop

1. Since the term "general shop" has begun to be used rather extensively it becomes necessary to define it and then to hold to this definition in discussing the subject. One source of a definition is the opinions expressed by educators speaking and writing on this subject. These are few and widely varied. The term "general shop" is used in several articles appearing in the Industrial Arts Magazine and also in the Industrial Education Magazine. The same content as we often find expressed under the caption "general shop" is discussed in many more articles as industrial arts. Where writers have used the term "general shop" they have seemed to have two general ideas in mind. One group of educators has meant a round of shop activities by which a boy might spend some time, varying from three weeks to a year in each of several different shops. These shops would be the traditional shops doing woodwork, plumbing, printing, forging or whatever other shop activities the particular school might be equipped to do. The "general" idea would be in the fact that the student has had experience in enough different shop activities to give him a rather general industrial training without attempting to give him a high degree of skill and knowledge in any one line.

The other group of writers mean by "general shop" a single shop equipped with the tools and machines of several different trades all of which are being taught at the same time. Even here there is a division of opinion. In one such general shop the student would rotate through the activities of each trade much as in the first case, only he would do all his work in the same room and, needless to say, the equipment would be much less extensive. The other type would require the student to make projects, involving activities in three or four lines. For example, he might build a radio set which would involve electricity, soldering, woodworking, and painting. Or he might build a wagon which would involve woodwork, forging for axles and straps, moulding and pattern making for the wheels, and possibly some machine shop work such as drill press, lathe work on wheels, and so on.

2. Another method of finding a definition for the term "general shop" would be to make a careful study of a large number of schools having a shop or system

which they called by that name. The author has investigated several such systems personally and has heard in detail the reports of several other investigators. These investigations agree with what was said above under (1). The systems in general fall into the three groups described. There are, however, two variations of these which are rather common: the farm mechanics shop and the household mechanics shop.

B. Kinds of General Shop Systems

1. *Household Mechanics.* One type of general shop program which has much to commend it is household mechanics. It is very seldom that a so-called household mechanics course confines its activities to subjects which would properly come under that name. In discussing such a course, however, it will probably be best to remain strictly within that field, always bearing in mind that there are numerous situations where it may be advisable to develop a composite course built from the activities which strictly speaking belong to a well defined field.

Household mechanics would have as one of its primary aims the training of worthy home membership, giving knowledge of and developing skill and interest in activities pertaining to the mechanical work about a home. The activities fall into two groups, repair and construction. They involve some of the operations from a large number of trades, including carpentry, plumbing, concrete, sheet metal, plastering, painting, interior decorating, blacksmithing, electricity, cabinet making, upholstering, landscape gardening, and quite a number of others. The fact that a boy has an opportunity to try out so many trades makes this type of shop work exceedingly valuable in regard to the exploratory aim. Its content is based on real needs arising in the boy's life and so satisfies the interest factor. It is help in preparing for home membership. The general hand and machine tool training undoubtedly provides some foundation for vocational training if the boy chooses a mechanical or technical pursuit.

The handling of such a course offers some difficulties. Many of the home repair and construction activities such as building a fence, wiring up a light circuit, hanging a screen door, building a concrete walk and many others cannot be done in the school except as exercise work and that would be poor pedagogy. While I have never heard of its being done, I see no reason why such projects, as the need for them arises in the boy's own home, might not be done as home project work the same as corn, poultry, and pig projects in agriculture, and bread baking projects in home economics. In addition to these there are innumerable projects which can be done in school. Repairing a lawn mower, an electric fan or a toaster, building a chicken coop or a dog-house, repairing a water faucet, and a great many other such projects could be done very easily in the school shop.

Within its limits a household mechanics course realizes all the aims of industrial arts much better than the traditional course; this is not conclusive proof, though, that it is in all cases the best general shop course to offer. If some other combination of activities can be found which, in a particular situation, realizes these aims more fully and with less difficulty in organization, then the other course should be offered.

2. *Farm Mechanics.* In a rural community, shop work in farm mechanics would probably be much better than household mechanics alone. The farm mechanics work should include much that is given as household mechanics, but it would need to be a longer course and should be a part of the work in the senior high school for vocational agriculture students. The junior high school years would include household mechanics and some of the simpler farm repair and construction jobs. In the tenth, eleventh and twelfth school years, a few hours a week could profitably be given to auto, tractor and gas engine repair, carpentry, concrete and simple masonry, plumbing and sanitation, farm machinery repair, simple carpentry such as garage, shed, hog house construction, sheet metal work of the kind useful to the farmer, electric wiring, ignition, care and use of motors, farm lighting plants and such like. The ideal would be to give the boy such knowledge and skill in mechanical work that as a farmer he could and would maintain a farm repair shop where he could make a large percentage of the repairs which the average farmer must now hire made at considerable expense of both time and money. Not all the fields of activity useful to the farmer could be covered, but in a course of six years, junior and senior high school, even though he had only two hours a week when we add his home project work, the boy ought to become an excellent general mechanic able to make any ordinary repair or do any ordinary piece of construction for which need would arise on the up-to-date farm. For those of the rural boys who did not take vocational agriculture, there would be the three years junior high school period during which they would have a combination of household mechanics and simple farm mechanics.

As suggested before, no course should be so inflexible that nothing outside its particular field could be done. Many of these boys in rural schools during the seventh, eighth and ninth grades will be just as much interested in projects appealing to their play tendencies as will the town and city boys. There is no reason why the rural boy should not make a radio set, a pushmobile, a toy motor and such like as a part of his household or farm mechanics course The course may be called by one of the latter names and center around such activities, but it should by all means be flexible enough to allow the introduction of other things when the need for them arises in the life of the boy.

3. *The Shop Rotation Plan.* Earlier in the discussion a plan was mentioned by which the students in schools large enough to have several different kinds of shops, might spend some time in each of these with the idea of exploration foremost. This is one of the most common forms of industrial arts and while it has never been that of the general shop until lately, it may well be given as one of the forms of general shop procedure because it involves many of the fundamental principles given by general shop advocates.

From the exploration viewpoint it is probably the best plan of shop activity. By having the work in separate shops there is not the tendency to have the work of different trades overlap, consequently the student

gets and opportunity to try them under what approximates trade conditions much more than where there are elements of several different trades combined in one project.

The second advantage is from the administrative standpoint. It is so much easier to group students by shops and grades than by any other method. There is some question as to the length of time a boy should spend in any one shop; as to when he should take any particular shop course and as to which and how many of these he should take.

If the work is to be done during the seventh, eighth and ninth years, the boy will have six semesters which may be distributed through several shops. There are the following well defined trades which may be and commonly are taught in schools: Cabinetmaking, carpentry, patternmaking, moulding, forging, machine shop practice, electrical work, plumbing, auto repair, sheet metal work, drafting, agriculture. Quite a number of others may be taught, such as brick and stone masonry, concrete work, painting and interior decorating, acetylene welding and others too numerous to mention. In addition to this wide range of trades there are other lines as commercial and business work, professions, salesmanship and many other vocations which the boy should learn something about and, as far as practical, try out.

From this list of vocations, which after all are only a very small percentage of the number existing, it will readily be seen that the exploratory problem is by no means an easy one. No school can hope to find the correct vocation for every boy by the end of the ninth year. It should, however, find out whether he will profit by a college training; whether it is probable that he will go to college; whether he desires to go. If he falls within the college group, it is questionable whether he should choose his vocation this early. If, on the other hand, he cannot, will not or should not go to college, as determined by his intelligence, special aptitudes, achievement, interests and situation then the school should in a large majority of cases have found within fairly narrow limits, what occupation he is going to follow so that he can get some training for it in the senior high school or elsewhere. This does not mean that the school has said definitely that this boy shall be a machinist, that one an auto mechanic and the other a carpenter. The boy who will succeed in one of these trades would probably succeed equally well in either of the others. But there may be a distinction between plumbing and printing; electricity and bricklaying; molding and drafting and such other widely differentiated trades.

The logical conclusion is, then, that a boy during the junior high school period should try out in mechanical lines, if there is any doubt about his future, until he knows whether he wishes to pursue a mechanical course, either trade or collegiate. He should try out enough different trade lines to have some idea of what each group demands in the way of skill and knowledge and what it offers in the way of satisfaction to him as a vocation. In order to do this he may try during the six semesters from four to eight activities. As an illustration let us place a course.

7th Year	8th Year	9th Year
1. Woodwork Simple carpentry and cabinet making. Drawing correlated.	1. Sheet Metal Drawing correlated.	1. Printing Commercial art correlated.
2. Woodwork More differentiated drawing correlated.	2. Electricity Drawing correlated.	2. Machine Shop Drawing correlated.

This course would give a boy an insight into six entirely distinct trades. In other cases auto repair could well be substituted for machine shop or electrcity; plumbing could be substitued for sheet metal and many other changes made. The exact course would be dependent on the local situation and the equipment. The one principle to be borne in mind is that the trades should be widely varied and that too many should not be tried. Woodwork has been placed first and given for a whole year because woodworking equipment is more common; the work is more nearly in the proper difficulty level for seventh grade boys, and it serves as a fine foundation in the way of tool and shop knowledge for the more difficult shop courses following.

As we have seen, this plan of general shop is the best yet devised for exploratory purposes. It would probably be as good as any other purpose so far as shop work aids and it would give an exceptionally fine all round mechanical training on which to base vocational trade training later. If it has any disadvantages they would be in connection with the secondary aims and not the primary.

It is questionable whether such a course would appeal to the interests of the pupils as much as a course in which they could make projects for which a real need had arisen at that time in their lives. This would be necessary to retain them in school.

The provision for individual differences could be met as well this way as any other.

The particular needs of the adolescent boy would be partly met by this plan.

There would be very little direct provision for better home making as the boy would not gain a great deal of tool skill and knowledge which he could use around the home, although he would gain some of these.

There would be nothing here to provide for better use of leisure unless it would be through the interest in doing things which would give him an incentive for further study during leisure.

It can be seen that the advantages of this plan are great and the disadvantages are few. Those few might be partly overcome by a judicious selection of projects so that they would not be too narrowly confined to a given field.

For schools large enough to make a variety of shops economical, this plan is probably the best general shop plan to be found. However, there are very few junior high schools or rural consolidated schools or small town six-year high schools which can afford a very large assortment of shops. To meet this problem, in all except the largest cities, some other plan needs to be devised.

Organization and Teaching of Sheet Metal Work in the Junior High School

Frank A. Schneider.

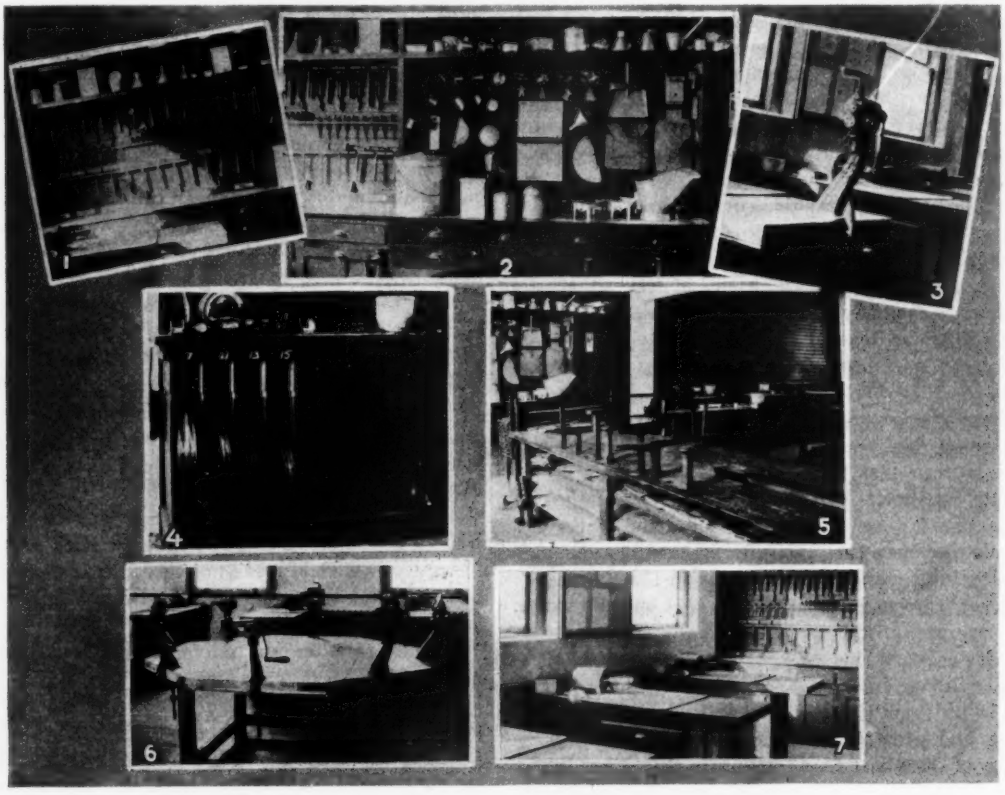
Sheet metal work in the junior high school is rapidly coming into favor, since it provides an opportunity for becoming acquainted with a large variety of machines and tools playing an important part in industry.

America is forging ahead in industry faster than any nation, as indicated by the fact that two out of every seven persons are engaged in industry. Over 75 per cent of the school children leave school before reaching their eighteenth birthday, and a large majority of these work with their hands. It is necessary that we give these children training that will help them choose a vocation and that will give them an idea of the modern industrial life.

The junior high school, in its industrial-arts program, is meeting a distinct need in offering forms of prevocational work that will help pupils who leave school early to go to work. Sheet metal work as a junior high school activity gives boys a wide knowledge of tools and machines used in industrial pursuits; it offers a knowledge of a wide range of materials for new and increasingly important uses; it provides opportunity to work with the hands on problems requiring co-ordination of eye, mind and hand, and it gives definite training in habits of accuracy, neatness and industry that are a help in the skilled occupations.

A wide range of useful and practical articles can be made of sheet metal, which offer valuable training in shop practice, as well as retaining the interest of boys. In the Harmon junior high school, the industrial arts department comprises a sheet metal shop, a wood working shop and a mechanical drawing room. The schedule provides for two shop periods of ninety minutes each per week, with rotation of classes at the end of each thirteen-week period. In the seventh and eighth grades, the boys rotate between the three shops, remaining thirteen weeks in each. In the ninth grade, the boys devote one hour each week for thirteen weeks to work in the three shops.

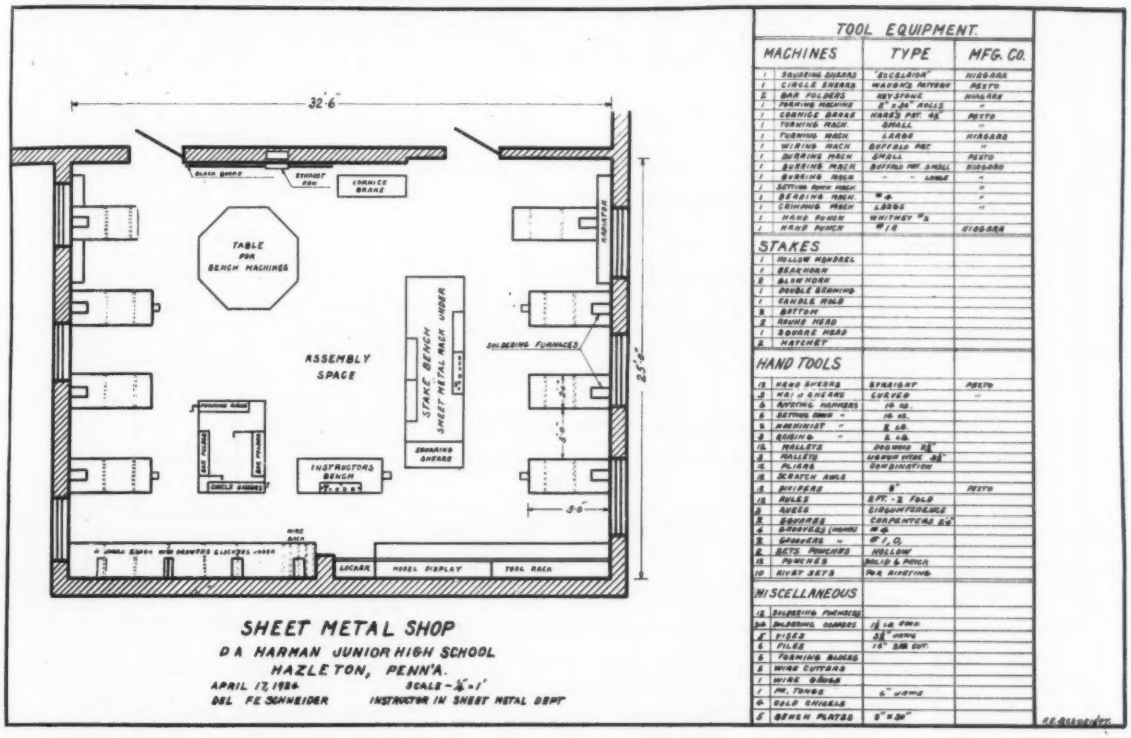
The industrial arts work is largely of a try-out nature; those showing an inclination to the work are permitted to specialize in the vocational school located in another building. In sheet metal work, the boys are given instruction in the fundamental principles, using common sheet metals, working tools and machines. The purpose is not to produce expert sheet metal workers but merely to offer a knowledge of the tools, processes and materials used by the worker in the industry. Even though comparatively few of the boys eventually take up the trade, the training aids in vocational guidance. In the Harmon junior high school, classes consist of 18 to 24 boys, who come to the shop in four groups daily. Under the schedule about 300 boys are handled in a week's time. At the end of each thirteen weeks a new group takes up the work.



VIEWS OF SHEET METAL SHOP, HARMON JUNIOR HIGH SCHOOL, HAZLETON, PA.
1. Tool Rack. 2. Display Case. 3. Typical Student's Bench. 4. Case for Materials. 5. General Bench with Stakes. 6. Tool Bench. 7. Typical Students' Benches.

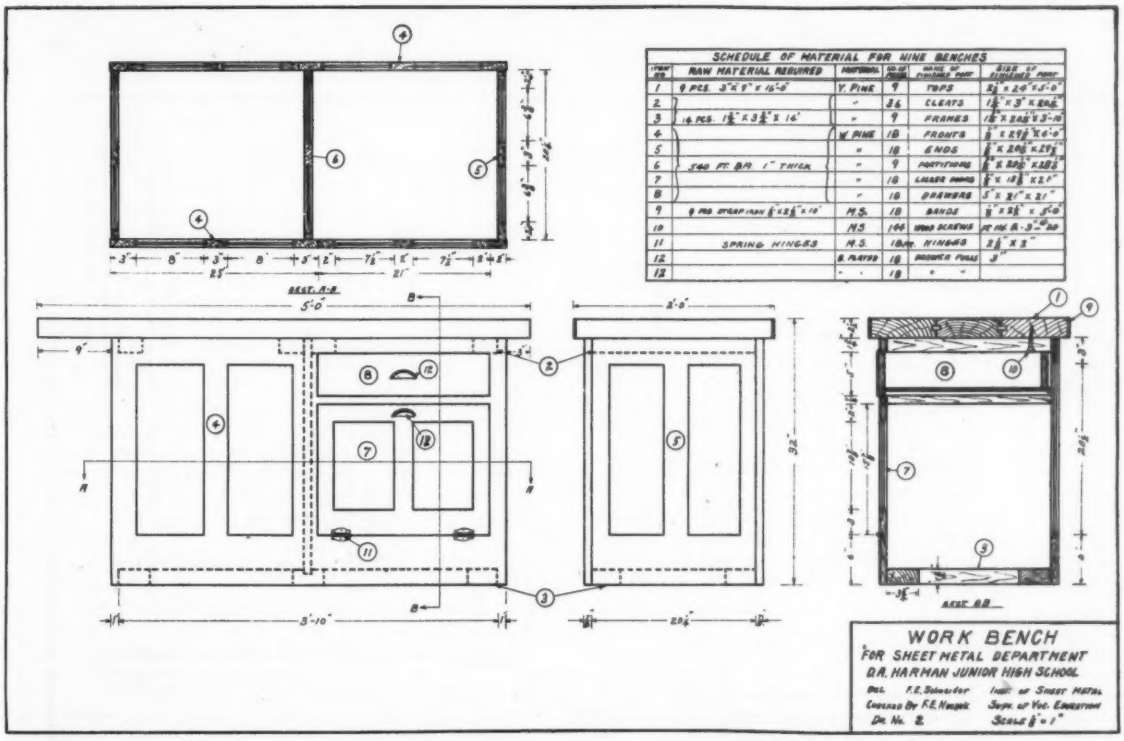
In developing the course in sheet metal work, it has been necessary to work out the layout of the shop, to initiate methods of instruction, and to arrange projects which fit the needs of the local situation and which produce the greatest teaching results. The accompanying illustrations of the shop layout and equipment represents the shop as it is at present arranged.

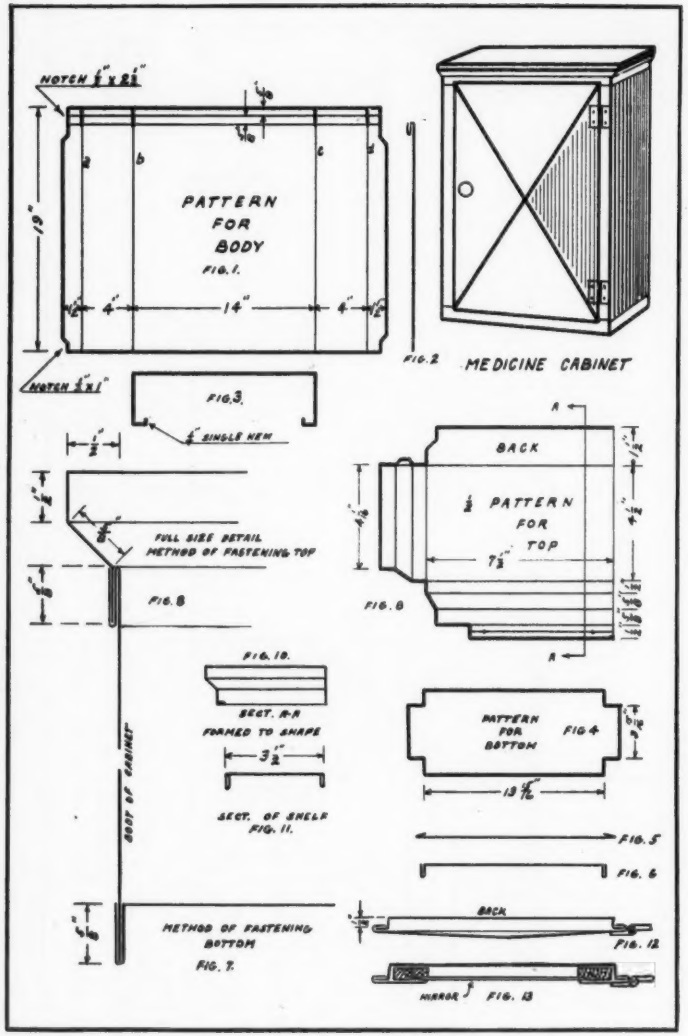
The benches were planned and constructed in the



school shops, and are designed for two boys each. The drawers and locker space are arranged to care for unfinished work. On each bench there are a soldering furnace and a receptacle for rosin and acid fluxes, and sal-ammoniac. A large pad of fireproof wall board on each bench top serves to protect the top from becoming marked with hot copper and affords a splendid surface from which to pick up waste solder. Each bench has a metal worker's vise. The arrangement of the benches minimizes the number of steps to be taken, and keeps the boys separated and in order while doing bench work and soldering.

The instructor's bench is so placed near the general machines and tools that the students may witness demonstrations from the class assembly space. The bench





MEDICINE CABINET

The medicine cabinet is to be made of 28 gauge galvanized iron. It is to be 14" wide by 18" long and 4" deep. It is to have two shelves and the door may be either made solid or with a mirror. Top is to project over front and ends ½" and be flush with back.

INSTRUCTIONS

1. Cut out material for body as per pattern, Fig. 1.
2. Slit upper edge 1¼" with hand shears on lines a, b, c, d.
3. Turn upper edge on bar folding machine set for $\frac{5}{16}$" as shown in Fig. 2.
4. Form body to shape in cornice brake as per sketch Fig. 3.
5. Cut out bottom as per pattern Fig. 4.
6. Turn edges on bar folder, set at $\frac{5}{16}$" and form to shape as shown on Figs. 5 and 6.
7. Assemble bottom to body of cabinet and squeeze up seam tightly with mallet over mandrel stake. See Fig. 7.
8. Lay out and cut top as per drawing Fig. 8. See full size section, showing method of fastening top. Fig. 9.
9. Form top to shape, as shown in Fig. 10. Form long side first on cornice brake. Finish forming with hands.
10. Assemble top to body of cabinet.
11. Lay cabinet on plane surface and solder top and bottom to body. Use freshly prepared acid and wipe off excess flux with damp rag after soldering.
12. Make two shelves for cabinet as per cut Fig. 11 and solder in place.
13. Make door for cabinet, either solid or with mirror as per Fig. 12 or 13.

Note: If door is made solid, or without mirror, it is advisable to crease the front of the door along the diagonals to give a raised effect. It serves to keep the door in better shape. An $\frac{1}{16}$" clearance around the door is advisable.

14. Assemble door to side of cabinet by using loose pin hinges, size 1½ by 1½. The pin should be removed and the hinge reversed as shown in Fig. 12. Solder and rivet hinges in place.
15. Paint with two coats of flat white and one coat of enamel.

MAIL BOX

The mail box is to be made of 28 gauge galvanized iron.

INSTRUCTIONS

1. Lay out and cut out pieces A, B, C, D as per patterns.

Body Pattern "A"

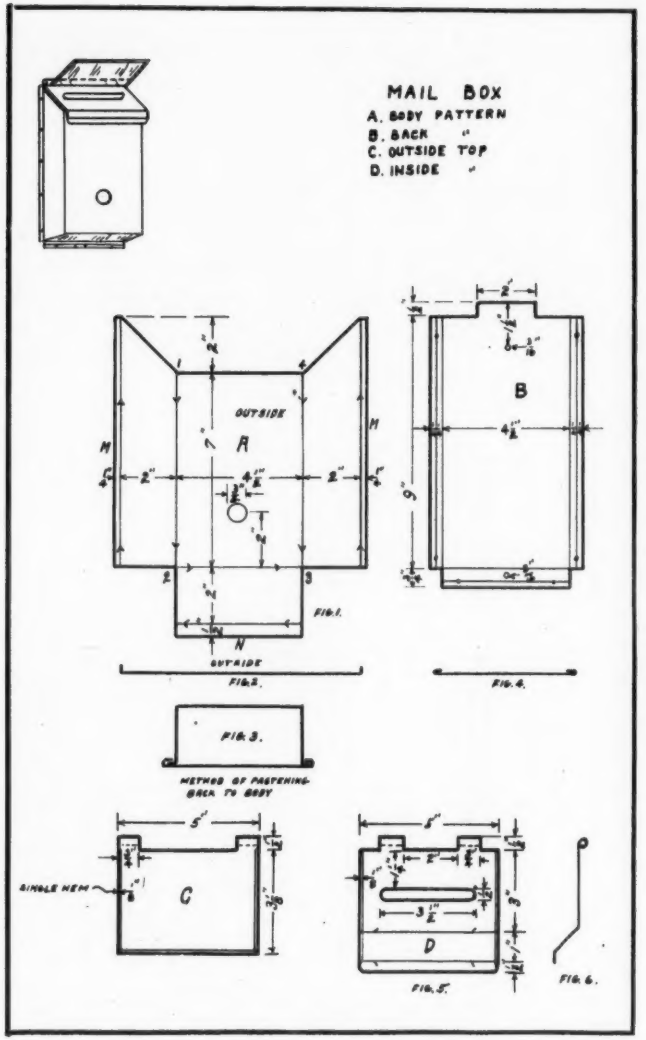
2. Place work "outside" of body pattern "A" and draw lines 1-2, 2-3, 3-4, as shown on Fig. 1.
3. Turn up edges "M" at right angles on bar folder set for ¼" towards the outside. See Fig. 2.
4. Turn up edge "N" at right angle towards the outside on bar folder set at ½".
5. Bend down sides and bottom towards the inside on cornice brake. See Fig. 3.

Back Pattern "B"

6. Turn $\frac{3}{16}$" sharp fold on sides of back (sides and bottom only), as shown on Fig. 4.
7. Assemble body and back as shown in Fig. 3. Place 4½" block on inside of box and pinch down seam in cornice brake. Prick punch edges of seam about every 1½".

Inside Top Pattern "D"

8. Cut out mail slot using ½" hollow punch and cold chisel. Fig. 5.
9. Turn ¼" single hem on sides towards the inside and form to shape in cornice brake as per Fig. 6.
10. Assemble inside top to mail box by using a piece of No. 12 wire for a hinge pin. Bend flap on back pattern towards the back and flaps on pattern "D" towards the front.
11. Single hem edges of pattern "C" towards the inside and assemble to hinge pin as inside flap.
12. Mail box may be painted with aluminum paint or coated with bronze enamel. U. S. Mail may be painted on pattern "D" or front of box.



is similar to those used by the pupils, with the addition of a bench plate for holding stakes during class demonstrations. Incidentally, it might be added here that in demonstrating, the instructor uses the class instruction sheets and carries on the work step by step exactly as the students are expected to do with the help of the instruction sheets.

Sheet metal work in any junior high school gains by the display of models attractively mounted for the inspection of the class. Well designed and carefully made models arouse the interest of the pupils and provide a goal of high-grade workmanship and technique which is a constant inspiration. The model display rack in the Harmon junior high school shop includes not only articles made by the instructor and expert workmen, but also exceptionally well made pieces of members of the class.

Hand tools are arranged on a tool rack where they can be easily checked up at the end of a class period. Small tools like files, groovers, rivet sets, rules, solid and hollow punches, cold chisels, etc., are kept in special racks below the tool board. Similar racks are also provided for different sizes of wire used for stiffening articles.

For the protection of comparatively delicate machine parts, it has been found advisable to install lock nuts, especially on burring and wiring machines, to prevent the pupils from squeezing the rolls. The hardened thin edges of the rolls, when pressed too tightly, are likely to chip. Similarly, the squaring shears are guarded by means of a one-inch pipe flattened at each end, and placed just in front of the blade, in front and above the bed of the squaring shears.

The accompanying job sheets illustrate work which is typical of the problems attempted in the Harmon junior high school.

Trapping the Quick Brown Fox

Frederick Ames Coates, Assistant Agent, Vocational Division, Massachusetts Department of Education

IN speaking recently with a man intimately familiar with the history of a certain trade school, I commented upon the small enrollment in the printing department, contrasted with the other department of the school.

"I am not a bit surprised," he answered with some feeling. "The wonder to me is that they get anybody at all. Of all the lifeless, uninteresting things that a healthy boy can spend his time on in school—"

This to a printer was not merely sacreligious, but incomprehensible as well. That printing, so inspiring in its history, so educative in its practice, so broadening in its contacts with art, science, literature and commerce, could seem to anyone, of all things, uninteresting—!

My friend was not unwilling to elucidate. "Most city boys have had some contact, either personally or through friends, with prevocational courses in school. They have at least an inkling of the various trades. I agree that printing pays better than many trades. It offers steadier employment. Geographically, it is as widespread as any, ranking with the building trades in that respect; and in most cities it is one of the dominant industries. Yet, ever since the term that I myself spent in printing, in grammar school, I have had such a prejudice against it that I often actually wonder how the industry gets enough recruits to keep its plants running."

I could not question either the man's intelligence or his sincerity. Somewhat chastened, I listened for the reasons underlying his viewpoint—a novel one to me.

"Any other type of shopwork is just that: shopwork. A boy is *doing* something. He doesn't get the promise of being allowed to do something in the dim and distant future; he does something the first day, and every day. Perhaps he is put on a machine; perhaps he works with hand tools. It makes no difference. He is getting activity and new experiences. What is he getting in printing? Abstract study: learning the case! By the time he has lived through that, he is eligible for the questionable reward of being allowed to stand still for hours at a stretch, testing his knowledge: setting type. Later in the year, when he gets his infrequent turns at the press, he is encysted with indifference: nothing will interest him then. The high spot of the printing course is the day he leaves it."

I refuse to believe that all boys, or most boys, get this attitude. Yet, are not printing instructors prone to overlook the disadvantage which their craft really does suffer, as compared with other shop courses, and thereby to discourage and turn away boys who might make the very best of recruits to the trade?

Why must presswork follow late in the year—if it must? Why must actual "printing" come only after a great deal of deadening drill on a process whose results to the boy seem intangible? Logically, to be sure, composition precedes presswork; but why be sticklers for logic? There are today in most cities more pressroom employes than compositors. If a boy wants to be at a machine, controlling the wheels which go round, cannot his normal desire be satisfied? If not the first day, at least within a reasonable time of entrance, would it not be wise to give each beginner as much pressfeeding experience as the equipment permits?

But after all, there is more to be taught and learned in the field of composition than in that of job presswork. The start must be made some time. The case must be learned.

There is probably no topic so fruitful of argument among printing instructors as the method of teaching the case. The arguments themselves are too frequently fruitless; each antagonist is interested only in expounding his own method, and not at all in listening to others. In the past, I myself have waged battle for two special methods—at different periods of my shop-teaching experience. More recently, I have had opportunity to observe several different ways of teaching the case, as actually practiced by teachers. I have seen successful results follow methods which I would class as poor ones. I have acquired a tolerance which I wish I might pass on to teachers of printing everywhere. Openmindedness is one important key to success. If one compares his own method honestly and frankly with others, he can not fail to profit, even though he adheres to his original choice. Preferably the comparison should be a practical and not merely an intellectual one. An adequate testing of one after another, and a careful weighing of results, is an experiment which should yield a very definite choice and an unassailable basis for that choice.

1. The first method of teaching the case—first only for the arbitrary purpose of listing—is displaying a chart or blackboard diagram of the case to the pupil, and telling him to "study" it—memorize it. There are, of course, many variations: the positions of the letters may be studied at haphazard; in left-to-right and top-to-bottom order; in alphabetical sequence; in order of importance and size of boxes; in groups, as of punctuation marks, spaces, letters, figures, capitals, and lowercase.

2. A process relying also on abstract memorization uses instead of a chart an actual case. The case is usually an empty one, though there appears no good reason why it should not contain type, if only to satisfy the beginner's curiosity. In any event, it has its compartments marked in some manner; with chalk or pencil marks, or with cards or slips of paper.

3. Sufficiently different to be classed as a distinct method is the use of reason and association in memorizing. This method takes cognizance of why some boxes

are larger than others, and may include the counting of letters in printed matter to determine actual frequencies. It may call attention to such alphabetical sequences found in the lower case as c, d, e, (hiatus), f, g; l, m, n, o, p, with its two interruptions; and the reverse sequence, t, u, v.

4. A process providing activity other than the purely mental, calls for the preparation by each pupil of a chart of the case. This may mean filling in the letters on a chart already having printed case-divisions, or it may mean actually constructing, with ruler and measurements, a diagram of the case. The letters are copied from a chart such as is used in the first method. The pupil usually preserves his diagram in a notebook or otherwise, for future reference.

5. The method long used and ably advocated by Mr. Harry Osgood, of Jersey City, gives each boy an unmarked case of type, a stick, and some leads. The boy is shown how to hold the stick, and how to pick up type and arrange it in relation to its nick. He is required to set first a line of lower case e's. Later, other letters prominently located and of frequency-importance are added to his "repertoire", one or two at a time. Long before the end of the first lesson, the pupil finds himself setting such lines as "t h e space t h e space", and so forth. He memorizes by actual use; and his memory is muscular and visual as well as intellectual. No effort is made to cram the lay of the entire case into his head within a time limit. Simultaneously, the beginner is acquiring familiarity and facility with the actual tools and materials of the trade.

6. Some instructors, thoroughly converted to the principle of "learning by doing", give a boy a stick and a piece of copy, stand him in front of a case, and tell him to "go to it". For his guidance in what would otherwise be a fruitless search, they provide a chart or diagram of the case showing the letters. The problem of justification is handled when it arises by the instructor, who demonstrates it to each pupil and gradually weans the latter from his help.

7. A similar method supplants the chart with cards or slips of paper, laid in the compartments of the case on top of the type. The theory here is that there is no "carry-over" between chart and case; that the pupil's attention is concentrated.

8. A method which I have not seen in practice, but of which I have read, uses an empty case and a large number of small letter-cards. One card is placed—by the instructor—in each compartment of the case, thus serving as labels. The others, in a well-shuffled pack, are given to the pupil, who is expected to place them in the proper compartments. Though actual type is not used, and therefore the arm and hand motions do not contribute to future skill, this method is in a way the converse of the last three, in that the pupil learns the case by distributing instead of by setting. It would seem that this process could be adapted to use with real type, in an easily-read size; fourteen-point or larger.

9. Still another practice adopted by some instructors is to give the pupil a stick and a case of type, and let him investigate for himself, without charts or marks. While this ministers to the pupil's curiosity, and confers on him the desired privilege of "setting his name", it is a question whether it does not finally prove discouraging through wasted time and effort, and it certainly is not conducive to clean cases.

In talking with printers, both instructors and others, I have found that a very large majority of them, learning their trade in the shop, acquired the case by means of the seventh method here listed. This in itself is no argument for that method; neither is it an argument against it.

After all, is there any need to be dogmatic? Must we quarrel furiously, like Gulliver's "little-enders" and "big-enders"? Dogmatism has been the bane of academic teaching since the year one. Language study is only now recovering from the fiercely-defended formalism which dictated a silly emphasis on the bare skeleton of grammar —merely because, forsooth, every language does possess such a skeleton. Why not keep our skeletons in the closet, or in the cave where they belong, when we are dealing with living things?

Vocational education, and its handmaidens, prevocational and manual training, are of sufficiently recent origin to be still, fortunately, in the experimental stage in the matter of methods. Heaven help the experiment which entrenches itself behind arbitrary rules, and throws down the gage of battle to all nonconformists! Printing instructors as a rule have great freedom of method. Theoretically, they are untainted with formalism. But actually, many of them think of "school" in terms of their own schooling, before liberalization had breathed upon the educational dogma of the last generation. They should realize that their freedom is a thing to be fought for, rather than lightly to be thrown away. Only through experiment can progress come.

I would earnestly recommend that every teacher of printing "think through" every one of the methods above listed—and any other methods, if such there be, of teaching the case. Some of them you can perhaps safely discard without trial—but not safely without thought. Instead, however, of taking it out in argument when you meet some instructor of opinions opposite to your own, try his method; try others; watch and tabulate the results. You will eventually hit upon a method, a modification or a combination of methods, which will serve you well—as a starting point for further progress and change.

Industrial Science in the Shops

Percy E. Rowell, Technical High School, Oakland, Calif.

The adaptation of science instruction to the needs of those taking shop work, or, to put it in another way, the development of courses in industrial science for boys between the ages of 14 and 18, has been delayed and handicapped by two factors: First, because the attempt was made and, unforunately, is still being made, to adjust the so-called college-preparatory courses in science to the academically-determined requirements of boys taking vocational work, rather than to inaugurate entirely new courses, suggested and controlled by the demands of actual trades; secondly, due to the fact that they were already at hand, the apparatus, laboratories and lecture rooms of the college-preparatory departments were used for the vocational science courses in place of rooms and equipment intended and designed for that special purpose. No consideration of the content of industrial science courses will be given at this time; the present article is devoted to a discussion of the physical aspects of the problem as it relates to the laboratory and equipment.

The science rooms should be in the shops, that is, somewhat centrally located, with the shops grouped around them. There is a psychological advantage of proximity which should not be neglected but utilized in every possible manner. The boys must be led to realize that shop work and science are inseparable, that they are two points of view of the same work—the manual and the mental—and that both are needed in order to obtain the *whole* of their course in industrial work. They need also to feel that the industrial science belongs to them—to gain a proprietary interest in the science rooms and to feel that their course is worthy of a place of its own, near their shop work and functioning with it. If the science work is performed at some place distant from the shops it becomes too often a distinctly different subject, an out-

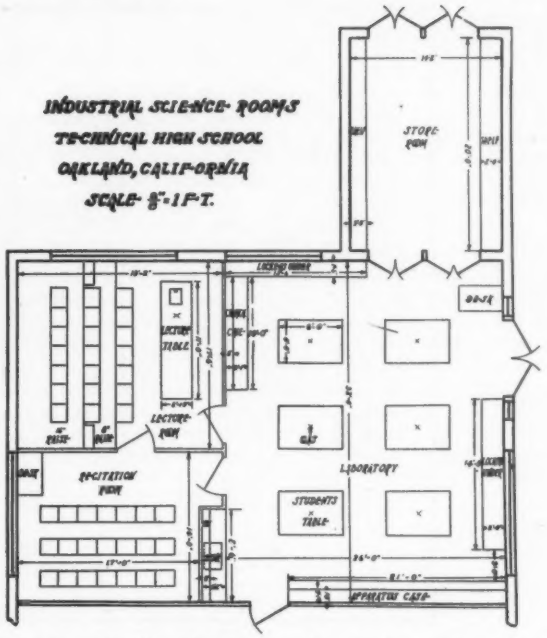
SCIENCE LABORATORY AT THE OAKLAND TECHNICAL HIGH SCHOOL, OAKLAND, CALIF.

side subject, an additional subject, making it very difficult to teach effectively and efficiently; it tends to become academic—science for science's sake—and ceases to be industrial in the opinion of the students, if not in reality. Industrial science should not be taught even in rooms originally intended for college-preparatory science, or it will inevitably suffer from the insidious viewpoint of the latter—a preparation for the further study of science, rather than a study of science for the good which may be obtained from it for immediate use.

Even the apparatus used in teaching industrial science, with the exception of the most elementary principles, should be of a type distinctly different from that used in the teaching of college-preparatory science. Where possible, the apparatus should consist of the actual industrial material, tools and equipment in the various trades. Thus commercial pumps, air compressors, heating devices, carburetors, transformers, motors of all kinds, and other devices based upon scientific principles should take the place of the time-honored science apparatus. It is very advisable that a large amount of this apparatus be modified, or redesigned, and made in the shops, by the boys, in connection with their science work, since under these circumstances the latter will have a strong appeal to them and become in their opinion a worth-while subject. Such a combination of shop and science work can not be feasible unless the science laboratory is closely connected with the shops through actual physical nearness.

With this close connection between shops and laboratory there is a reciprocal relationship causing the shop work to become more in accord with the science work. Although there is always a recognition on the part of the shop instructor that all industry must rest upon a scientific basis, combined with the skill of manipulation, there can never be such a complete realization of the interplay of science and industry until the shops and laboratory help each other through actual activities. A shop-equipped science laboratory becomes, to a great extent, a shop laboratory fitted to teach industrial science under actual shop and scientific conditions; a science laboratory equipped with the standard scientific apparatus too often may become a sort of museum, a place of ingenious curiosities, practically divorced from the shops both in reality and in spirit. Apparatus which a group of boys has made in the shops when used in the laboratory, has a greater value and is more real than an unfamiliar piece of common apparatus. That is, most of the mystery surrounding much of the standard apparatus like a smoke screen, thereby hampering its teaching value, has been removed; the attention of the student can be focused upon the actual scientific principles which the apparatus has been designed to illustrate.

The making of apparatus should not be undertaken without a definite plan, and the detail of the design should be left to the students. The best method of procedure is to have the class, under the skilful direction of the teacher, recognize the need of a certain piece of apparatus, in



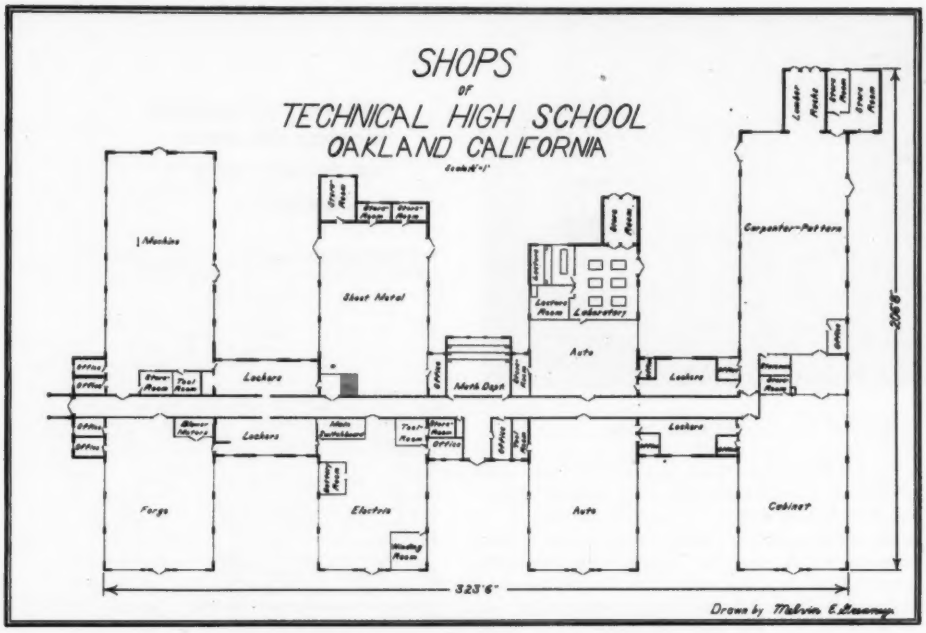
order to make the science more clear to its members, thus making it *their* undertaking. Then it may be planned by a volunteer group, or assigned, and designed in the drawing rooms. The shops construct the apparatus from the drawings and it is finally tested in the laboratory.

Since Smith-Hughes science is comparatively a new subject it is very hard to convince school authorities that it is any different from any other science. Therefore, the need for special rooms and equipment can become recognized only after long argument backed up by strong evidence. Even after a proper recognition has been won, the question of cost must inevitably arise in addition to the problem of physical space for the new rooms. Finally, the whole plan must be so well organized that the work may be distributed equally to the various shops, and extend over a period of years, appreciating the truth that development can come only through growth.

The problem is in the process of being solved at the Oakland Technical High School by dividing one of the shops (as shown in the general plan of all the shops) into halves, and then by subdividing this space so as to provide three rooms—a large laboratory, a lecture room and a recitation room. As the science instruction is given by two men only two rooms are occupied at one time, thereby rendering possible complete flexibility between lecture work, laboratory work and recitation. The drawings give only the plan and thus a rather full description is necessary to do justice to the combination.

In the drawing of all the shops it will be noticed that there are four shops on each side of the corridor, with one recitation room opposite the side entrance. This room is used by one of the teachers of mathematics, the other mathematics teacher, as well as the two English teachers being assigned to rooms not in the shop building. The shop chosen for subdivision is on the south and receives sunshine all day. The only drawback to the location of the science rooms is that they can be entered readily only through the other half of the shop which is used as a lecture room for the automobile shop.

The laboratory is a large room, 32′ x 26′, well lighted by 350 square feet of window space, with no ceiling except the roof, which is about thirty feet high. The exposed trusses serve both as object lessons and as supports for various experiments with heavy materials. On the left, as the laboratory is entered, is a set of lockers in the table of which is a sink of vitrified ware, 30″ x 20″ and 8″ deep, and over the sink are shelves for bottles and other glassware which is to be, or has been cleaned. The height of the sink-table is the same as for all of the furniture in the

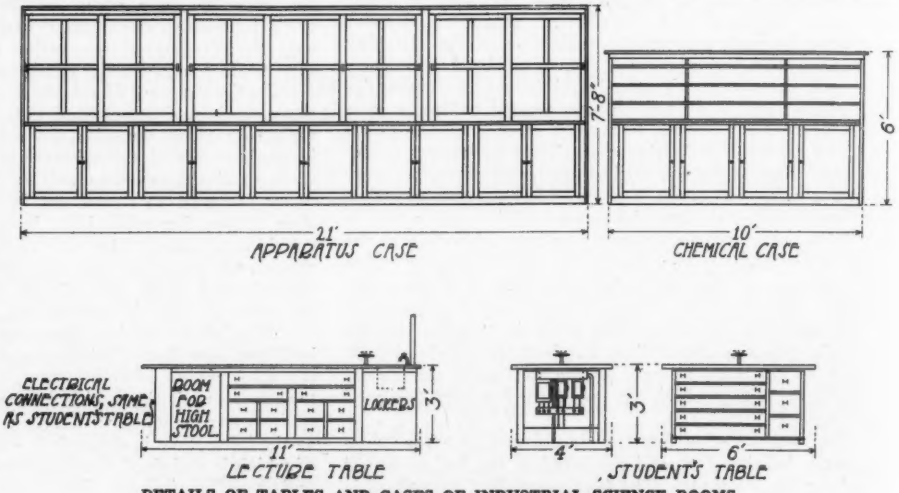


FLOOR PLAN OF SHOPS, OAKLAND, CALIF., TECHNICAL HIGH SCHOOL.

department—36". On the right of the entrance is a large case for the better apparatus, 21' x 7', 8", and 25" deep at the bottom, fitted with ten locker doors, and 15" deep above the table level, fitted with seven sliding glass doors and adjustable shelves. The details of this case are shown in the front elevation in the drawing of tables and cases. Another case is placed next to the lecture room, so that the supplies may be available both for the lecture and laboratory work, fitted with four locker doors underneath and open shelves on top for chemicals. These are arranged alphabetically in glass-stoppered bottles. About 28 feet of wall locker tables complete the outline of the room.

Especial attention is called to the students' laboratory tables. There are six of them and the plan is to have four students at each table, except at one table where extra experimental work is available for those who work rapidly. These tables are so spaced as to avoid mutual interference, thus permitting each group to work without interruption. Each table is provided with ten drawers 3', 7" long and 4½" deep, and six drawers 1', 6" long and 8½" deep. These drawers take up the entire space beneath the tables, with the exception of a toe space, and are used for storing the apparatus and material most commonly used by the students. The method of storing, however, is not according to the students, that is, each table is not supplied with all the common apparatus needed for each group of students, but according to the general divisions of science. Thus all of the apparatus and supplies which are needed for the study of heat are in one table, while other tables carry the material for the study of electricity, mechanics and light. Trays have been made of sheet metal to fit the drawers in multiples of eighths, sixteenths and thirty-seconds, both longitudinally and transversely, to hold all of a kind of various articles, so that they may be distributed and collected easily and efficiently. The combination of drawers and trays produces a practical means of indexing and checking the apparatus.

Each table is fitted with four flush plates on the top, into which may be screwed nickel plated steel standards, four feet long; these are supplied with suitable clamps, sliding and adjustable hooks, so that any kind of support may be supplied. In the center of each table is a four-way gas cock. At the end of each table are electric switches, enclosed with jack connections, so as to provide 220 volts, three-phase alternating current, 110 single-phase alternating current, and one other switch, the wires of which terminate in the electric shop so as to permit connection with from one to fifty storage cells, or 110 volts direct current, or, if desired, 500 volts direct current. The drawing of the students' table shows the arrangement of the drawers, electric switches and jacks. Each table is supplied with plug connections and electric cables which



DETAILS OF TABLES AND CASES OF INDUSTRIAL SCIENCE ROOMS, TECHNICAL HIGH SCHOOL, OAKLAND, CALIF.

terminate in U-connectors. The laboratory is furnished with 24 high stools as much of the work may be performed better sitting than standing. A desk for the laboratory teacher completes the equipment.

Attention is called to the large storeroom, 20′ by 14′. This room which opens directly upon a driveway, is planned to receive commercial apparatus, either as gifts or loans. Shelves are provided for permanent material, and the room serves as a museum as well as storeroom. The proper use of this industrial material will determine to a great extent the nature of the industrial science course.

The lecture room, 19′ by 17½′, has two rises in the floor, to provide an unobstructed view for three rows of students. Tablet-arm chairs give opportunity for note taking. A window 10′ by 9′ floods the room with light. The lecture table (see illustration for details) is supplied with water in addition to equipment similar to that of the students' tables. The room for a high stool furnishes leg space when the stool is being used; the latter is more convenient than a chair, since much of the lecture work is given when standing. The table is also supplied with a variety of drawers designed for lecture material. The top drawer is five feet long and is used for glass tubing, stands, rods and long pieces of apparatus. The other drawers are supplied with trays similar to those in the drawers of the students' tables.

The recitation room makes no claim to originality; it is furnished with tablet-arm chairs and a teacher's desk. Both the lecture and recitation room are lined with blackboards permitting all of the students to work at the same time. On both sides of the communicating door are bulletin boards, one in each room, on which are posted items of scientific or industrial interest.

The cost of this outfit depends entirely upon the amount of work to be performed by the students in the various shops. In the case of the Oakland Technical High School, the partitions and the tables were made by the mechanical division of the school department, while all the cases, shelves, lockers, standards, jacks and plugs were produced by the work of the students. In general, however, the cost may be reckoned as the cost of raw material. It must not be forgotten in considering the cost that there is a tremendous educational value in directing the work of the students toward their own education. This alone warrants the undertaking.

Britannia Metal—XII

Color and the Britannia Lighting Unit

Professor William H. Varnum, University of Wisconsin.

"It is no sin for the artist to borrow from the past, provided he returns the principal with the interest."
—Ruskin.

IN planning lighting fixtures as explained in article eleven, it is unnecessary to keep the mind in one rut and follow the traditional lighting fixtures of quantity production. On the other hand, home limitations or tastes may require fixtures nearer to commercial patterns.

In quantity production, historic ornament gives the key motive for a large number of designs, varying from the Classic to Early English, Dutch, Colonial or Georgian, and the Arts-and-Crafts. As an example of adaptation, a large room heavily panelled with wood, built with strong vertical and horizontal members, with heavy mediaeval ornament, needs hammered wrought metal fixtures, either in copper or iron, with their proportions and contours in sympathy with the structural lines of the room, factors guiding one to select a period similar to the Early English for source material. For smaller rooms with Colonial motives, the designer should use simple, classic lines of the Greek or the Georgian, or one of its derivatives. For fixtures of this type, Britannia is in every way harmonious and effective.

The commercial designer begins his work by developing rough sketches drawn either in elevation or in perspective. By a process of elimination, he selects a satisfactory sketch which is worked over, refined in proportions and contours, translated into a scale elevation or perspective which attractively colored and rendered becomes the vehicle for the salesman on the road. The colored sketch makes a strong visual appeal to both dealers and customers, becoming an able substitute for

ILLUSTRATION 1.

ILLUSTRATION 2.

ILLUSTRATION 3.

the fixture. Draftsmen prepare a full size working drawing for the factory. For elaborate candelabra, blue prints from these working drawings often occur to the length of seven or eight feet.

For class work, the designs of Plate 1 approach commercial construction but are in no sense copies of commercial designs, as each maintains its own individuality. As in article eleven, the motives are from Colonial or Georgian sources and designed for houses similar in spirit, thus harmonizing lighting fixtures with the exterior, interior and ornamentation of the dwelling. This is regarded as essential to good taste in modern fixture design.

Referring to Plate 1, it is seen that Colonial doorways, mantle details, hardware and other architectural

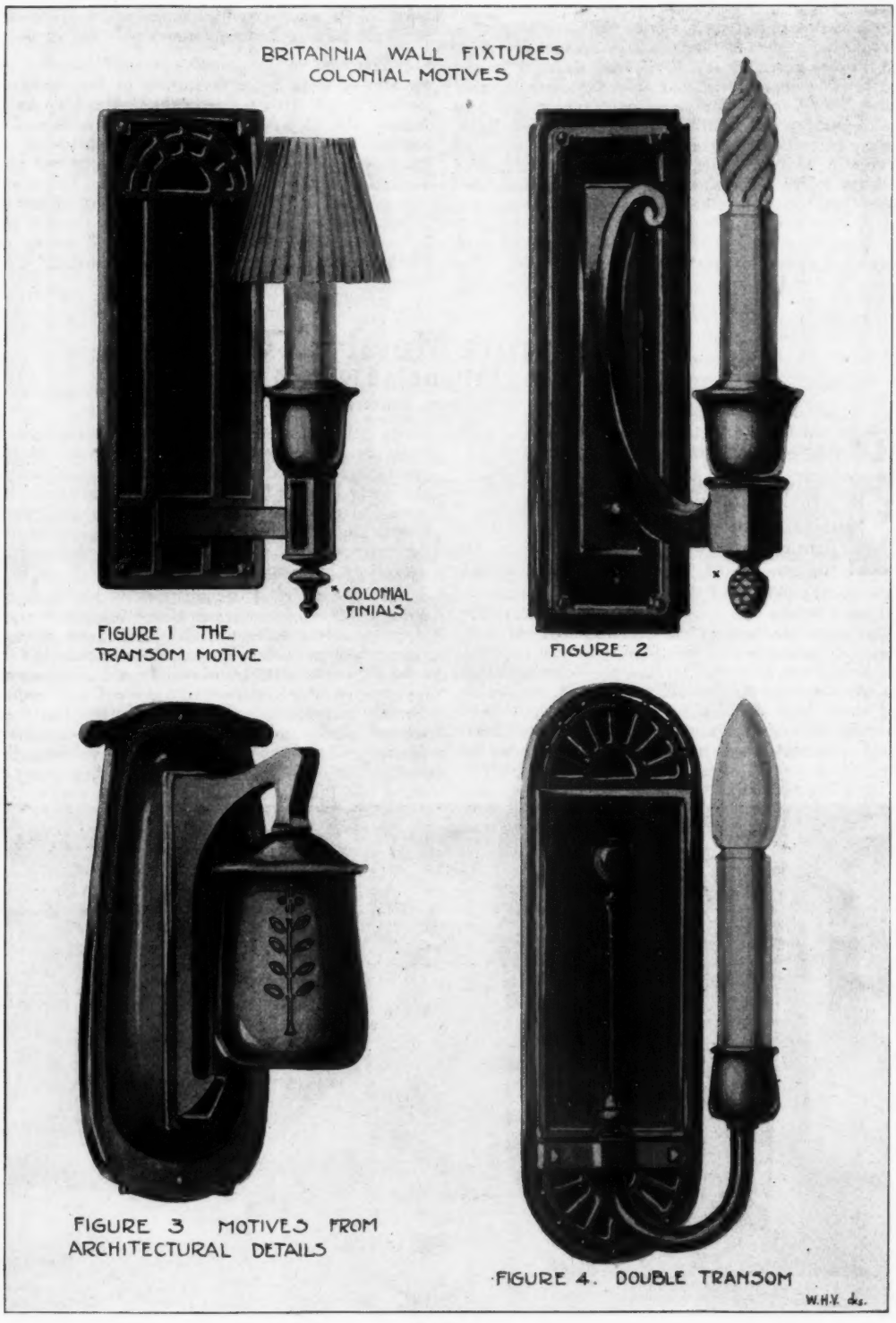
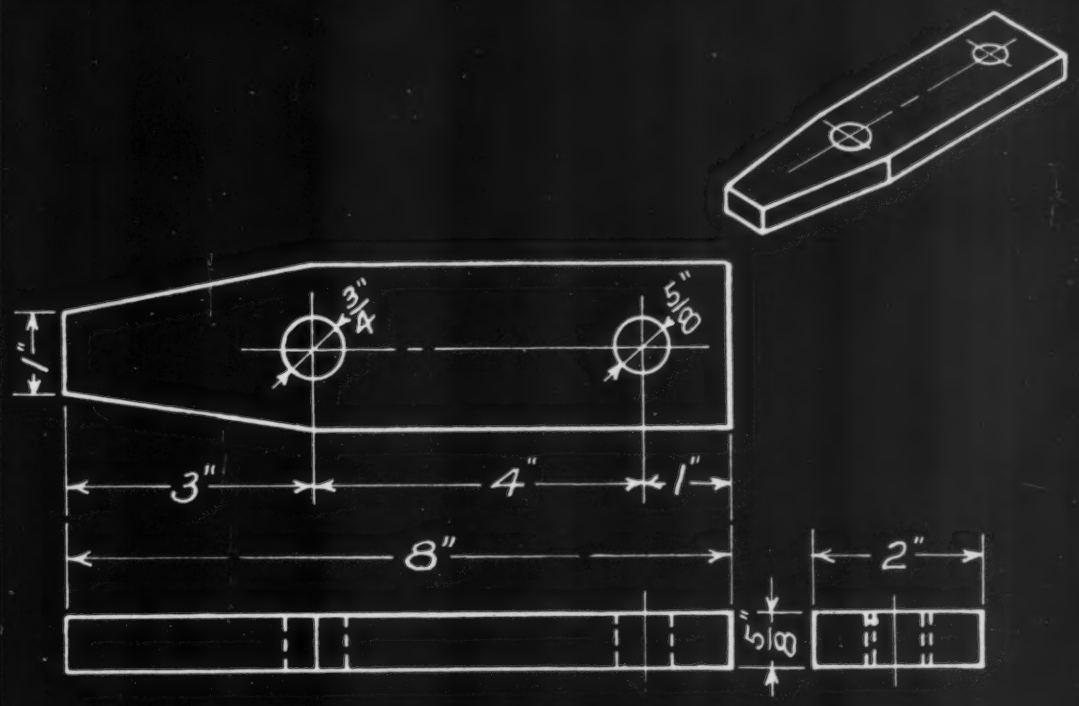
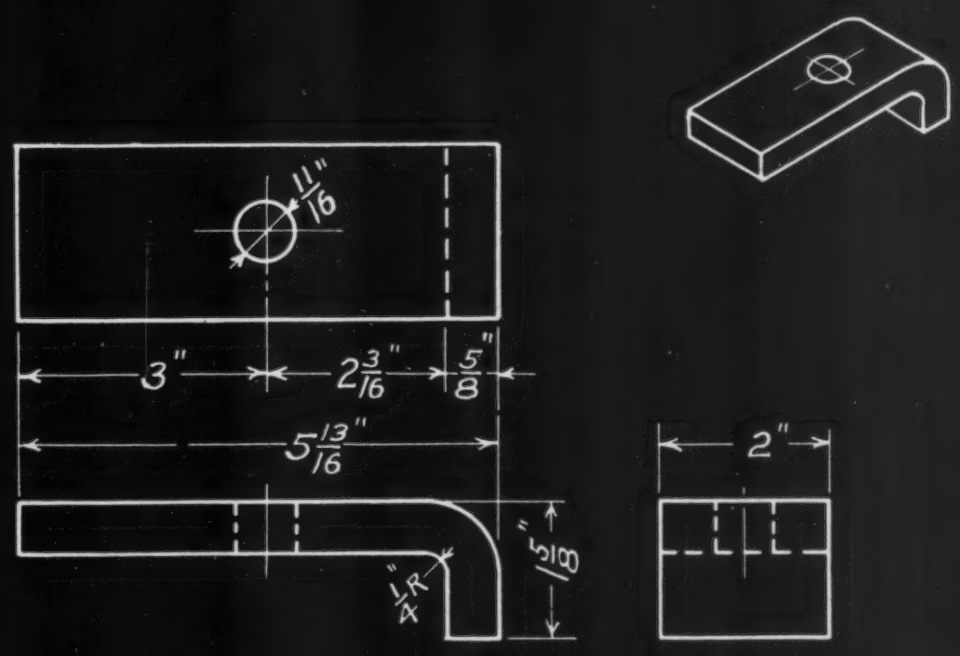


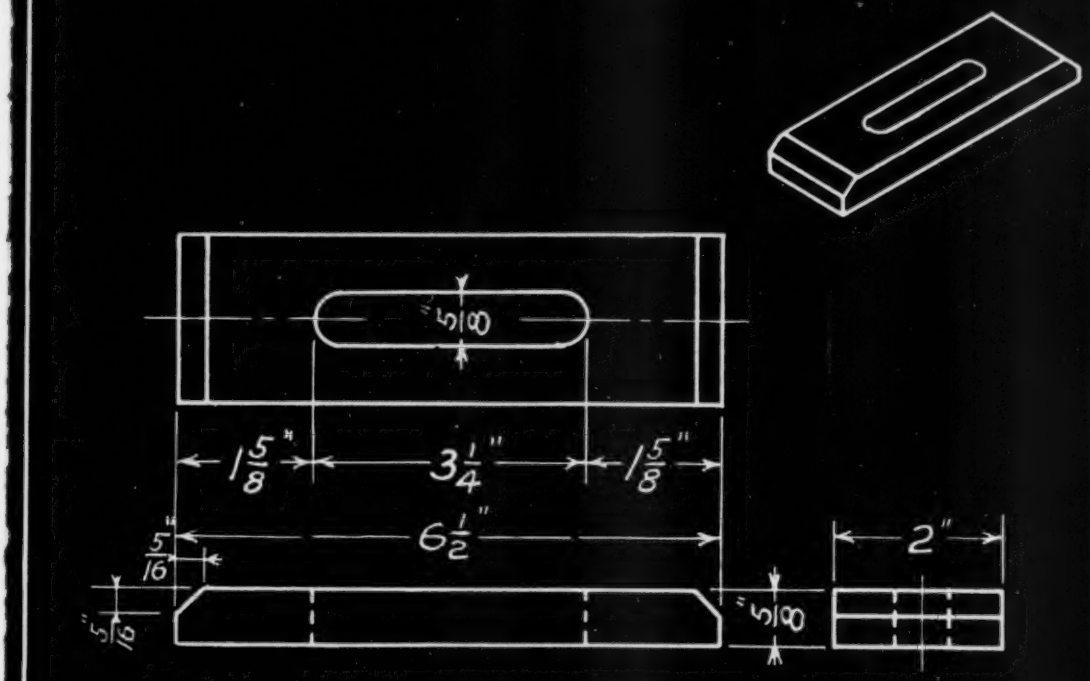
PLATE 1.



PLANER CLAMPING PLATE SHEET-1

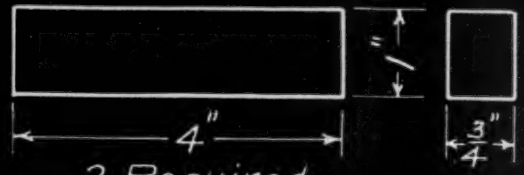


PLANER CLAMPING PLATE SHEET-3

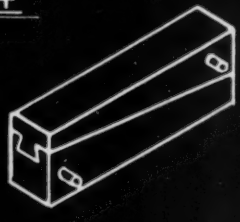


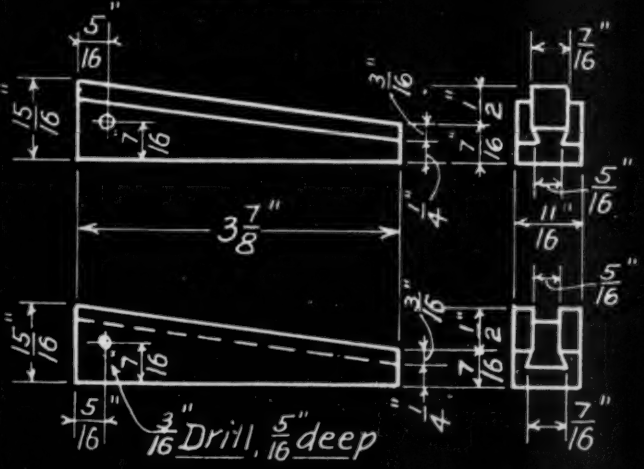
PLANER CLAMPING PLATE SHEET 2

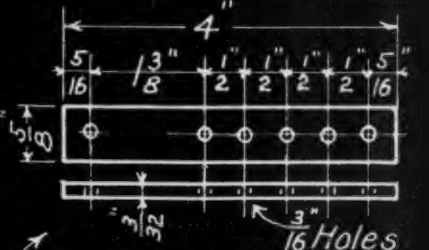
PARALLEL WEDGES SHEET-4



2 Required

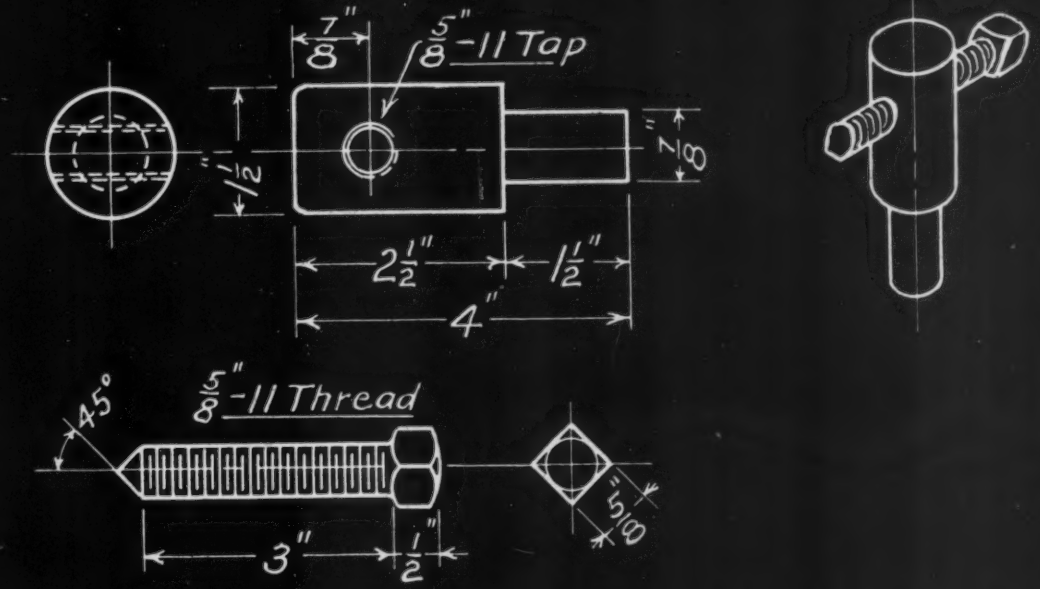




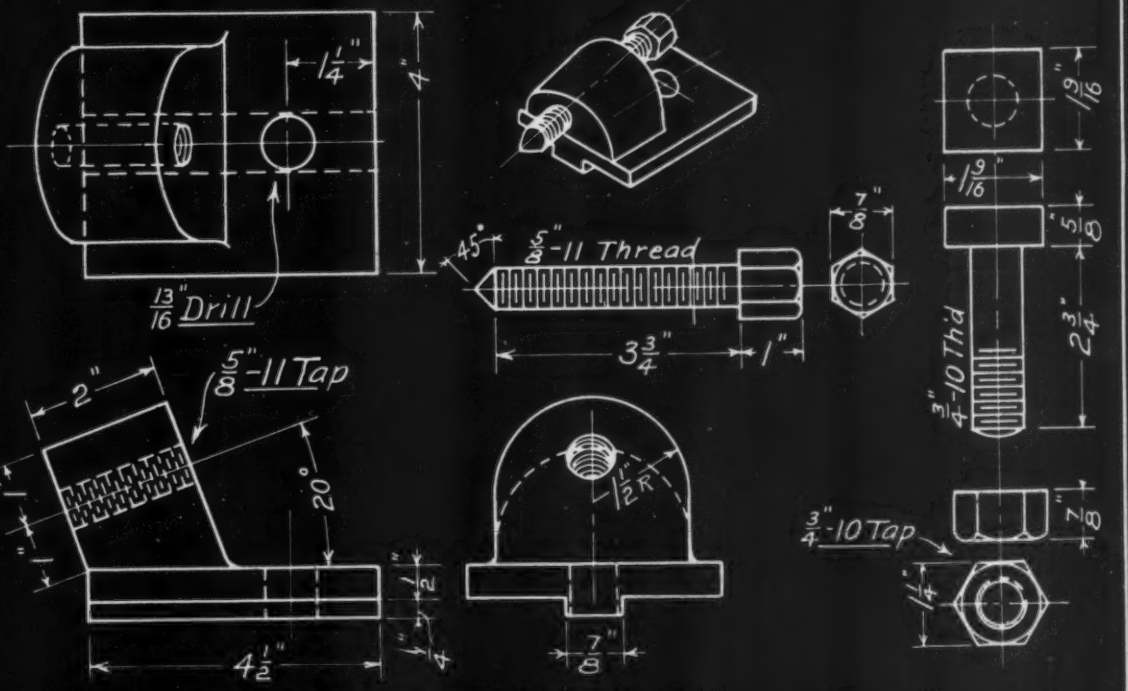


Rawhide Strip, 1 req'd.

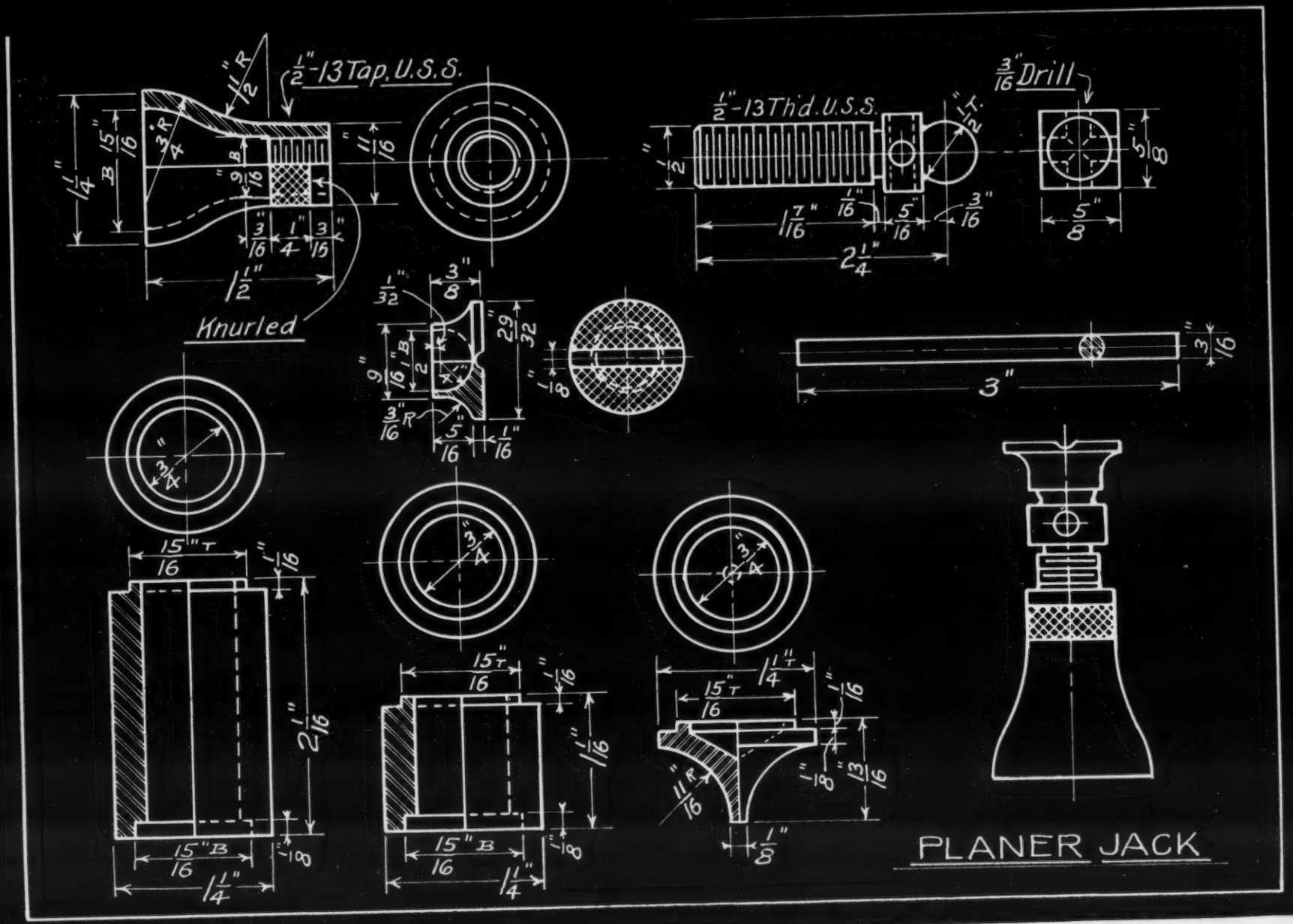
2 Pins req'd.



PLANER CLAMPING SCREW SHEET -5



PLANER CLAMPING SCREW STOP SHEET-6


1/2"-13 Tap, U.S.S.
1/2"-13 Thd. U.S.S.
3/16" Drill
Knurled
3"
PLANER JACK

PLANER EQUIPMENT

Herbert D. Harper, Murray Hill Vocational School, New York City, N. Y.

The need of adequate equipment for strapping down work on a planer, shaper or milling-machine table is obvious. Nevertheless some schools (like some commercial shops) are satisfied to use any kind of a makeshift strap or bolt, instead of providing suitable standard equipment.

This equipment can be easily made and provides problems of interest to machine shop students. Straps of three different shapes are shown in sheets No. 1, No. 2 and No. 3. They are made from machine steel, the holes and slot drilled or milled according to the drawings.

Sheet No. 5 shows the drawing of a stop, which can be made adjustable by tapping for a set screw. This makes it possible to quickly set up work with irregular edges. The stops can be made from machine or tool steel, the stems fitting snugly into the holes of the planer.

The parallel wedges in sheet No. 4 are very useful for supporting the weight of large pieces that must be machined on centers, fastened to either the planer or milling-machine table. After the work is properly located, by moving the two parts of the wedge lengthwise, it is possible to exactly fill the space between the work and the table, thus releasing the center points from strain.

The two parts should be made from cold rolled steel, case-hardened and ground. A few thousandths of an inch clearance should be left in fitting the tongue and groove, so that they move easily without shaking.

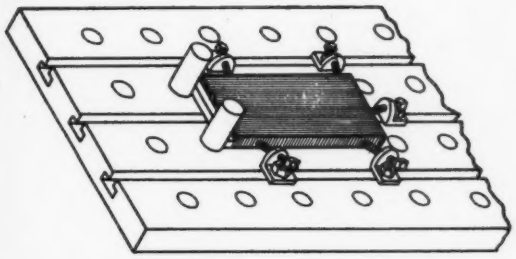
The narrow strip of rawhide fitted over the two pins maintains a constant tension, which prevents the parts being loosened by the vibration caused by the cutting tool.

The jack is also used for supporting work, and will be found more desirable than odd pieces of metal when blocking up a job. To allow for varying spaces, interlocking collars of different lengths are used. These can be made of tool steel or cold rolled steel case hardened.

Sheet No. 6 shows screw stops used for the purpose of holding down work that is to be planed or milled over its entire top surface at one setting, which makes it impossible to use a clamp. The screw stop frames should be steel forgings if possible; if not, they can be made from machine steel. On account of chips the tongue should not fit the planer slot too closely.

The fingers used with the screw stops are of varying lengths and should be made of tool steel about one-half inch in diameter .

Some shops use parts of discarded round files sharpened at one end and rounded at the other. The fingers should slant downward when in use, so that the pressure will force the work down firmly upon the table. This can be seen in the accompanying cut.



APPLICATION OF CLAMPING DEVICES ON PLANER BED.

Supplement to The Industrial-Arts Magazine, May, 1925.
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features similar to illustrations 1, 2 and 3, suggested the proportions and contours of the designs. The long and simple chased panels of Figure 1 are reminscent of door or fireplace panels, while the top fan-shaped ornament resembles the transom glass over a doorway. The small turned finial and contours of the socket enclosure were derived from classic mouldings.

Construction of Figure 1 normally would begin with the back or wall plate, chased as prescribed in article ten. To give a suggestion of thickness and, at the same time allow for space for the necessary wires, solder a rim of britannia to the back plates, softening its sharp front corners. The elbow leading to the lamp is a hollow square tube, readily made by bending a sheet of 18 gauge britannia. By cutting a deep V-shaped groove with the graver on each bending line, and folding the opposed surfaces towards the groove, a much sharper corner is formed. The graver removes surplus metal, having a tendency to make the corner rounding and not in accord with the demands of the design. The vertical square shaft is made in a similar manner with its depressed panels either carved or chased. Some craftsmen prefer to make square tubes from two right-angled pieces, with 45-degree soldered corners uniting the two sections. The lower part of the socket covering or "husk" may be made from a circular blank, beaten down into a depression, turned in a maple block or preferably by shaping up a cylinder, drawing in the base and expanding the top. Four small nickeled screws hold the fixture to the wall. A small silk shade is an important element for eliminating glare and adding color as amplified later in this article.

Figure 2, Plate 1, is quite similar in construction with a hollow connection link and wire duct between base plate and socket, leaving the wall with a tangential movement. It is better design for the bracket to leave the base plate either with a frank right-angle contrast or by a tangent with its resulting continuity. The pineapple frosted miniature lamp is re-echoed in the carved and turned pineapple finial. Interest is given to the surface by varying its texture, that is, by showing slight tooling of the background contrasting with the smooth surfaces of the higher areas. Tooling should be present only when it represents a perfectly normal product of the chasing process, in other words, a natural result of a necessary tool process.

If a downward concentration of illumination is desirable, use a design like Figure 3. A Colonial tankard handle supplies the sweep of the link, while the beautiful curves of a New England pulpit sounding-board suggested the shade top. A simple line motive enriches the britannia shade, developed either by engraving, pointelle work or by joggling, and justified by the fact that the shade is subjected to little frictional wear. The back plate is beaten down from the back to form its curved enrichment and afterward slightly planished, which should be done before sawing the exact and final shape of the contours.

Figure 4 again shows an adaptation of the transom motive with a small classic urn in chased relief. Shaped over a round rod, the wire conduit, or tube, can be formed by methods indicated in conical spout construction. To bend the tube, fill it with either wax or a pitch compound, shape over a large mandrel and planish if desired. To free the tube from pitch or wax, warm slightly, using care to avoid a serious explosion by applying the heat at the end of the tube rather than at the center.

As a form of surface enrichment, chasing, carving and tooling on small objects, like residence lighting fixtures, must be inconspicuous and in what is known as low relief, proportionately as low as modeling on coins. Do not let chasing be the "whole show", but subordinate it to the object as a whole; let proportions and contours have some claim for emphasis and beauty. Nothing in alleged surface enrichment can be less lacking in quality and beauty than is over-modelled and accentuated chasing as seen in illustration 4.

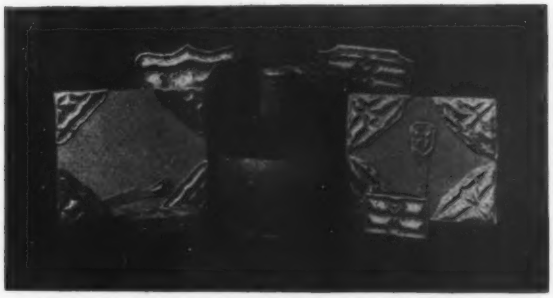


ILLUSTRATION 4. DESK PIECES WITH MODELED CHASING IN SMALL AREAS, PRODUCING ARTISTIC AND UNSUBORDINATED RESULTS.

In these articles, various illustrations have pointed the way toward originality of thought and the establishment of a proper background for such attainments. Educationally, no greater injury can be inflicted upon the pupil than that thinly disguised plagarism—copying designs of others, a practice which automatically eliminates all possibility of initiative and creative effort; basic values of craft work in general. I hold this to be true of problems with art content and those of purely utilitarian origin, from jewelry to electric wiring. The aims of a course may be contact and intimacy with material, but how much interest is to be expected in materials unless the pupil learns to make them serve as expression of his own ideas? Tool technique has its place but as means towards an objective of creative effort. Let us hope that the teacher whose educational badge of authority has emblazoned upon it as testing devices the straight edge, the try square, the caliper and micrometer gauge may learn to surround them with a laurel wreath symbolic of individual initiative and original achievement.

The field of original attainment is particularly pertinent to residence lighting in which the magnitude of the potentiality of colored light is changing the general conception of artificial light from a common utility to a fine art. Many people are indifferent to color or have a lack of consciousness or appreciation of its effects. If color is sufficiently used and thus brought to our consciousness, a clearing of mental color blindness would reveal the charm of the color world and the consequent reduction in the monotony of our achievement.

Color effects us in many ways, but for this article it is well to isolate and consider only two phases, the psychological and physiological aspects. Physiologically speaking, if we are brought into an atmosphere of certain colored lights, our nerves are stimulated and heart beats quickened while the resultant increased circulation produces an increased physical sense of pleasure and well-being. This type of stimulus has practically no esthetic significance, although it is a factor in considering colored lighting. Again, colored lights can make us cheerful, contented, depressed, or in a state of mind for mental concentration, indicating an emotional reaction to color or the psychological aspect of highest esthetic importance. Suppose a color makes us feel warm or cool: This stimulus stands between the mental and the physical excitants and possibly might be called the psychophysiological aspect, possessing low value in esthetic appreciation tests.

In recent tests[1] twelve colors were classified as to their psychological influences on different people, with the definiteness of each influence shown by the magnitude of the figure for each color.

[1]Luckiesh. Lighting the Home.

ILLUSTRATION 5.
PEWTER WALL FIXTURE FOR FLOOD LIGHTING.
(Courtesy of Kantack, Heath and Warman, New York City.)

	Exciting Influence	Tranquil-lizing Influence	Subduing Influence
Crimson	41	0	10
Scarlet	56	0	0
Deep Orange	59	0	0
Orange Yellow	55	6	0
Yellow	53	6	0
Yellow Green	14	39	5
Green	28	32	0
Blue Green	32	23	6
Blue	11	21	30
Violet Blue	0	17	45
Violet	0	6	54
Purple	3	1	48

The positively exciting colors are from crimson to yellow with the subduing hues from blue to purple, while the neutral or tranquil colors range from yellow green to violet blue. Grouped with reference to both psysiological and psychological aspects we have the following analysis:

Red, very exciting, irritating, bloody, passionate.
Orange, hot, warm, glowing, lively, suffocating.
Yellow, gay, extreme opposite of sickly.
Green, peaceful, neutral, tranquil.
Blue, cool, sedate, sober.
Violet, stern, hard, unyielding, gloomy.
Purple, stately, pompous, impressive.

While these tables show some inconsistencies, let us understand that the question of color appreciation is complex, but one that people agree as to the general truths of color reactions. Let the reader analyze his own moods when the bright sunlight relieves days of gloom and shadow, the effects of moonlight or his feeling of rest upon entering a big public library reading room with its green shaded lights.

So with the data at hand, we have a keyboard of color reactions either to accentuate, neutralize or balance the various moods of home, social, study and play life. Mixing colors by methods shortly to be explained will not only give more subtlety but with a neutralizer it is possible to tone down an irritating color to accord not only with the existing color scheme of a room but to more nearly match the mood of the occasion. Often two circuits are used for the two main uses of rooms as explained in article eleven. Rheostats or dimmers can be utilized to give greater or less illumination, affording flexibility and an avoidance of monotony.

How can the colored lamps be obtained? These are just appearing in the market but with a limited assortment at the present writing. Lamp dealers have varnishes and cellulose lacquers colored with dyes but which are likely to fade under the action of heat and light. They are, however, readily recolored. For secondary school pupils, the following method of coloring is simple and interesting, offering full correlation with other art projects. In a small sheet of wall board or thin board, bore a number of holes into which the lamps may temporarily be screwed. Prepare a thick, hot solution of gelatin and after having screwed the lamps into the wall board, immerse each one in the solution of gelatin and suspend them tip downward to dry. A baking powder tin makes an excellent receptacle for holding gelatin.

For coloring, use a dye formed from lantern-slide colors, Velox photographic coloring outfit, or any commercial water-soluble dyes. For coloring the lamps, detach from the board, holding them in a horizontal position, and with a large flat water color brush float a wash of color over each lamp. Do this by floating a band of color across the lamp from tip to base; rotating the lamp on its long axis, continue the wall of color around the lamp until the bulb is covered. Repeat this process until the desired color is obtained. For intense blues, violets and reds, it is best to use the commercial lacquers. If one has sufficient dye, direct dipping will give the best results. Dry the lamps carefully; they are now ready for use and fairly permanent. For lanterns, flat plates may be colored in exactly the same way, allowing, of course, for differences in planes. Sheets of colored gelatin are to be secured from stage electricians or from stage-lighting supply houses. Sheet gelatin wrapped into cylindrical form, between layers of wire gauze, forms good filters for concealed lamps. Placed between sheets of sanded glass, they diffuse light attractively for lanterns and mask the lamp mechanism. Checker board tinting of sheets of clear glass, placed under sanded glass, gives interesting tints of color. The recent popularity of parchment is too well known to need comment.

Silk shades make some of the most successful color filters, giving delicacy, subtlety and diffusion. By using several layers on the sides and a single layer across the top, varied diffusion is secured coupled with a practically uncolored downward light, usually a desirable factor. A white interior, or lining will give clear downward illumination, while colored linings reflect a faint mellowed echo of themselves. By using contrasting colors in shade con-

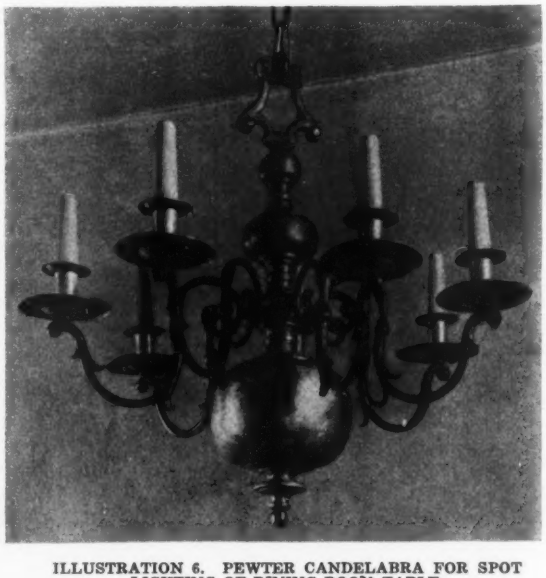


ILLUSTRATION 6. PEWTER CANDELABRA FOR SPOT LIGHTING OF DINING ROOM TABLE.
(Courtesy of Kantack, Heath and Warman, New York City.)

struction, an exciting deep orange lining with a subduing blue exterior for example, will produce a restful mixture of interesting quality.

In using colored lights, one must guard against theatrical effects. The light for common and daily use should be subtly tinted so that its effect is that of an atmosphere rather than a distant color. That is, upon entering a room, one should not exclaim at the redness or blueness of the color, but be subconsciously affected by the subtle glow. Using color tints or mixing analogous colors—or as suggested for silk shades—filtering light through layers of colors contrasting in influences but with the desired one slightly stronger than the other is conducive to the creation of the proper atmosphere. It is well to have on accent of brilliant color as a note of variety. Portable lamp shades frequently supply this note.

As light is the most powerful known stimulant for creating moods, it is easy to see that for a living room, subtle oranges, yellows and hints of red insure, or at least promote, a sense of happiness conducive to best social intercourse, while blue-greens and blues are excellent for general lighting of the study with its aim toward quiet concentration or writing. Portable lamps for the latter room with similar, or analogous shades, and uncolored downward light give illumination for work and accent to the room, while similar but possibly more ornamental lamps, with orange or analogous shades and tinted linings accord with the lighter living-room activities of magazine or newspaper reading, conversation, play and the varied occupations of family and social life. Wall brackets and portable lamps make the foregoing possible; using them together or separately much variety is obtained. Cove lighting, illuminated window-boxes, ceiling domes and special picture illumination point the way to many more interesting and beautiful possibilities of painting by light.

For the concealed, or flush wall fixture of article eleven, art or sanded glass alone, or with a colored filter, will give an attractive illumination. Applications of the preceding principles to Britannia fixtures will lead to instructive and educational interest in color which in no instance should degenerate into bizarre or Christmas-tree effects. The principles of unity governing pigmentary color harmonies, equally are applicable to lighting, which necessarily must be planned in sympathy with the daytime scheme of the room. So tone and finish a Britannia blend in sympathy with the remainder of the room fixture that it will lose all appearance of "newness" and scheme, and with the architectonic motive of the residence. A Britannia metal fixture, with its mood lighting, produces a true art metal problem with a rich field of correlated subjects briefly introduced in this article.

Minimum Equipment for Elementary Machine Shop Practice

G. H. Snaddon, Detroit, Michigan

The following list of equipment is suggested as a minimum amount for elementary machine-shop work where such courses as try-out in the eighth grade, elementary industrial trade in the ninth grade, and technical or general in the tenth grade are offered. It is adequate for a class of fifteen or twenty boys. Such small tools and additional equipment as the following can be made: Screw drivers, tap wrenches, center punches, nail sets, scratch awls, boring bars, monkey wrenches, hack saw frames, hammers, clamp dogs and sleeves.

10—9x3 Bench Engine Lathes.
1—12x5 Lathe with Taper Attachment.
1—13x4 Lathe.
1—20" Upright Drill Press.
1—Sensitive Drill Press.
1—Universal Grinder No. 0, with Standard Attachments.
1—8" Bench Grinder.
1—Plain Milling Machine No. 1½.
1—Plain Milling Machine No. 0.
1—Draw Cut Power Saw No. 1.
1—Mandrel Press No. 1½.
1—Muffle Furnace (Gas).
3—Anvils, Vulcan No. 15, 150 lbs.
12—4" Vises, No. 104.
Individual Lockers for students.

Drills—Taper Shank, High Speed.
6¼", 3 1/4", 3⅜", 3 7/16" 3½", 2 9/16", 2⅝", 2¾", 1⅞", 1-1".
1 Set standard wire gauge drills No. 1 to 60.
1 Drill Stand No. 1 to No. 60.
1 Drill Stand with drills 1/64" to ½" by 64ths.

Emery and Grinder Wheels
4—Grinding wheels ⅝"x6"x1" bore. 60J.
2—Emery wheels 1"x8"x⅝" bore. 36M.
2—Emery wheels 1"x8"x⅝" bore. 60N.

Files
1 Doz. Flat Bastard 8".
1 Doz. Flat Bastard 10".
1 Doz. Flat Hand Smooth 8".
1 Doz. Flat Hand Smooth 10".
1 Doz. Half Round Bastard 8".
1 Doz. Half Round Bastard 10".
1 Doz. Half Round Smooth 8".
1 Doz. Half Round Smooth 10".
1 Doz. Mill Files Second Cut 8".
1 Doz. Mill Files Second Cut 10".
1 Doz. ⅜" Rd. Bastard 8".
1 Doz. ½" Rd. Bastard 8".
1 Doz. ⅝" Square 8".
1 Doz. ½" Square 8".
1 Doz. Three square ½"x8x".

Milling Cutters
4—Plain Milling Cutters 2½"x1¼". H. S.
2—Plain Milling Cutters 2½"x4". H. S.
2—Side Milling Cutters 2¾"x½". H. S.
2—Side Milling Cutters 2¾"x⅝". H. S.
1—Side Milling Cutter 3" x⅜". H. S.
1—Side Milling Cutter 3" x½". H. S.
2 Slitting saws 2½"x 1/16". H. S.
2 Slitting saws 2½"x1/8". H. S.
1 End Mill 1¼" L.
1 End Mill 2" L.
1 Angular Cutter 45 R. H. S.
1 Angular Cutter 45 L. H. S.
1 Double Angle Cutter 90° included angle H. S.
1 H. S. Involute Cutter No. 3, 16P, 35 to 54T, ¼" bore.
1 H. S. Involute Cutter No. 4, 16P, 26 to 34T, ¼" bore.
1 H. S. Involute Cutter No. 1, 16P, 135T to Rack.
1 H. S. Involute Cutter No. 4, 20P, 26 to 34T, ¼" bore.
1 H. S. Involute Cutter No. 4, 10P, 26 to 34T, 1" bore.
1 H. S. Involute Cutter No. 4, 14P, 26 to 34T, 1" bore.
1 H. S. Involute Cutter No. 4, 18P, 26 to 34T, 1" bore.
2 H. S. Cutters for grooving reamers.

Taps and Dies
1 Set—Taps and Dies, ¼" to 1", V. S. S., Card No. 303 or P and W. No. 803.
3—¼"—20 Taper Taps U. S. S.
3—5/16"—18 Taper Taps U. S. S.
3—⅜"—16 Taper Taps U. S. S.
2—½"—13 Taper Taps U. S. S.
1—⅝"—11 Taper Taps U. S. S.
3—¼"—20 Plug Taps, U. S. S.
3—5/16"—18 Plug Taps, U. S. S.
3—⅜"—16 Plug Taps, U. S. S.
2—½"—13 Plug Taps, U. S. S.
1—⅝"—11 Plug Taps, U. S. S.

Reamers
1—Morse No. 2 Taper, Roughing Reamer.
1—Morse No. 2 Taper, Finishing Reamer.
1—Morse No. 1 Taper, Roughing Reamer.
1—Morse No. 1 Taper, Finishing Reamer.
1—Taper Shank Rose Chucking Reamer 1" H. S.
1—Taper Shank Rose Chucking Reamer ⅞" H. S.
1—Taper Shank Rose Chucking Reamer ¾" H. S.
1—Taper Shank Rose Chucking Reamer ⅝" H. S.
1—Taper Shank Rose Chucking Reamer ½" H. S.

Measuring Tools—Miscellaneous Tools
1—Belt Lacer, Clipper No. 3.
1—Box Belt Hooks, Clipper No. 3.
2—Tubes—Bearing Blue.
1—Belt Punch, Revolving 8".
6 Bars—Belt Dressing 2x8.
12—Bench Brushes.
1—Bevel Protractor, B and S. No. 495.
2—Boring Tool Holders, Armstrong No. 15.
50 ft.—Belt Lacing ½".
25 ft.—Belt Lacing ⅝".
6—Calipers, Lock Joint, Outside 6".
6—Calipers, Lock Joint, Inside 6".
12—Calipers, Solid Nut Outside 4". Starrett No. 75.
6—Calipers, Solid Nut Inside 4". Starrett No. 74.
1—Caliper, Firm Joint, Outside 8".
6—Calipers, Hermaphrodite, 4", S. No. 42.
6—Center gauges, B. and S. No. 650, or S. 391.
12—Center Punches.
2—12" Combination squares with center head and bevel protractor, S. No. 11.
3—6" Combination squares with center head, S. No. 23.
6—Center reamers, ½" size A, H. S. S.
6—Chisels, Cold, ¾ flat.
2 Doz.—⅛" Center drills.
3—"C" Clamps, 6", Agrippa No. 4.
1—Card Adjustable, Tap Wrench, No. 2.
1—Combination Tinners' Snips, Wiss No. 9.
1—Depth gauge.
12—Drills, Jobbers ⅛".

1—Drill and wire gauge, Starrett No. 185.
1—Dial Test Indicator, B. and S. No. 730 or S. No. 196.
3—Drill Chucks, Jacobs No. 3, with mountings M T No. 2.
2—Drill Drifts, Armstrong Automatic, No. 1A.
6—Dividers 4″, Solid Nut, S. No. 43.
3—Drill Sleeves, Morse 1-2.
3—Drill Sleeves, Morse 2-3.
3—Double Squares, 4″, S. No. 13.
1—Emery Wheel Dresser, Huntington.
1—Emery Wheel Dresser, "Diamo Carbo."
2 Quires—Emery Cloth or Aloxite No. ½.
2 Quires—Emery Cloth or Aloxite No. 0.
6—File Cards.
50—File Handles.
3 Pair Goggles.
12—Hammers, Ball Pein 1 lb.
2—Hammers, Blacksmith, No. 2 Maydole.
6—Hammers, Babbitt.
6—Hack Saw Frames.
2 Gross—Hack Saw Blades—Hand, 18T, 10″.
2 Gross—Hack Saw Blades—Power, 14T, 12″.
2 Hardies, 1″ Shank.
2 Cans—Kasenit No. 1 for Hardening Purposes.
3 Knurling Tools, No. 11K Agrippa or P. and W. No. 715.
12—Lathe Dogs, Clamp.
6—Mallets.
1—Melting Ladle.
4—Micrometers 0-1.
2—Micrometers 1-2.
1—Micrometer 2-3.
1—Micrometer 3-4.
1—Micrometer inside, Starrett No. 120A.
1—Oil Can, 12″ Spout, ½ Quart.
12—Oil Cans, steel, ½ Pint.
1—Oil Can 10 Gallon Capacity.
1—Oil Can 30 Gallon Capacity.
6—Oil Stones No. 292, Fine Carborundum.
1—Pliers, Combination 8″.
1—Pliers, Side Cutting 8″.
12—Rulers 12″, Lufkin No. 62.
1 Bundle—Rawhide Pins, Clipper No. 3 Bundle.
12—Scales, 6″, B. and S. No. 315.
2—Screw Pitch Gauges.
6—Scribers or Scratch Awls.
3—Squares, 6″, No. 540 B. and S. Hardened.
1—Square, Blacksmiths.
3—Surface Gauges, Universal, Starrett No. 56B.
2—Surface Plates.
3—Screw Drivers, 3″ Blade.
3—Screw Drivers, 6″ Blade.
3—Screw Drivers, 9½″ Blade.
1—Speed Indicator, Starrett No. 107.
1—Standard Twist Drill Gauge.
1—Set Steel Letters, $\frac{1}{8}$″.
1—Set Steel Figures, $\frac{1}{8}$″.
2—Skinner Vises, No. 4½.
2—Pair Tongs, Single Pick Up, 18″.
1—Pair Tongs, Lathe Tool, 18″.
2—Pair Tongs, Straight Lip, 18″.
1—Pair Tongs, Curved Lip, Fluted Jaw, 18″.
1—Threading Tool, Armstrong No. 50.
2—"V" Blocks.
2—Waste Cans, Spring Cover.
3—Wrenches, Monkey 8″.
3—Wrenches, Monkey 10″.
1—Wescott Wrench No. 76, 6″.
2—Wrenches, Crescent 8″.
2—Wrenches, Crescent 10″.
1—Wrench, Crescent 14″.
White Lead, 10 Pounds.

First Aid Supplies.

1—1 Ounce Bottle Iodine.
1—Roll 1″ Bandage Gauze.
1—Roll 2″ Bandage Gauze.
1—Package Absorbent Cotton.
1—4 Ounce Bottle Caron Oil.
1—Spool Adhesive Plaster.
1—Box or case to hold and protect these supplies for emergency purposes.

Stock

¼″ Tool Bits.
⅜″ Tool Bits.
¼″ Drill Rod.
⅜″ Drill Rod.
½″ Drill Rod.
⅝″ Tool Steel, Octagon.
½″ Tool Steel, Octagon.
⅜″ Tool Steel, Octagon.
1¼″ Rd. Tool Steel.
½″ Rd. C. R. S.
⅝″ Rd. C. R. S.
¾″ Rd. C. R. S.
1″ Rd. C. R. S.
1¼″ Rd. C. R. S.
1½″ Rd. C. R. S.
2″ Rd. C. R. S.
2½″ Rd. C. R. S.
3½″ Rd. C. R. S.
½″ Square, C. R. S.
⅝″ Square, C. R. S.
¾″ Square, C. R. S.
¼″x1¼″ Flat, C. R. S.
¼″x2″ Flat, C. R. S.
⅛″x1¼″ Flat, C. R. S.
⅛″x ½″ Flat, M. S. S.

Junior High School Woodworking

William V. Winslow, North Tonawanda, N. Y.

HISTORICALLY there has been considerable difference of opinion relative to the aims to be followed in the teaching of woodwork in our schools. When it was found that manual training as first taught could not be justified as a school subject, upon the ground that boys could not thereby be turned directly into industrial occupations, much was lost in the way of public support for manual training.

Manipulative skill, formerly stressed above all else, had to give way before more intelligent demands. As the machine was introduced into industry there was not the need for the kind of handwork previously emphasized in the school curriculum; in fact the universal value of such skill antedates the so-called industrial revolution. The machine, then, was introduced into the school shop for the reason that most of the work done in industry had become machine work and its introduction was the following of a precedent established in the industry.

The spirit in which boys take to machinery indicates their interest. Probably the most important single aim for industrial-arts work in the junior high school at the present time is the aim to furnish a means for growth, physical and mental. No school curriculum is complete without provision for industrial-arts courses, for only through such work can the boy be provided with the necessary means of growth. We have here coordinated mental and physical action, together with cultural associations, which work presented properly in the shop undoubtedly can furnish. No other department in the school in this way can be serviceable to the boy to the extent that the shop can.

What better place is there in which to apply science than in the shop. There are not only to be found applications of the simple machines—the lever, wheel and axle, wedge, inclined plane, and screw—but mechanism whereby the direction of force is changed from one motion to another through a most ingenious adaptation of of these machines, often combined to most efficiently fulfil a purpose.

Gravity, adhesion, cohesion, electricity—all have real application in the woodworking shop as in other school shops. There are speeds to be calculated for safety and cutting. The shop teacher may be teaching woodworking but beyond this he should be a teacher of science in its practical applications.

As the application of science to practical work has marked the progress of civilazation, such application should not be allowed to lie dormant in the school shop.

FIRST PRIZE, E. A. A. POSTER CONTEST, 1925.

Our shops should become laboratories where physical and chemical laws find application.

In a course in woodworking a cultural subject matter can be presented aside from the purely technical subjects so often associated with the various occupations. To appreciate a good piece of furniture the experience of having a part in the construction of such a piece is unquestionably of educational value, but aside from this a study of period styles in furniture and their historical significance, as applied to industry, adds an element of appreciation which perhaps can be gained in no other way.

A course in woodworking, then, may offer the greatest service in helping boys not to become makers of furniture but primarily choosers of furniture, although the shop activity will include something in the making as well. In addition, the teaching content should direct the child away from the *model* into the surroundings where the table, or the chair, is to be placed. Interior decoration becomes a vital consideration; form, line, color, all take upon themselves a significance of worth.

It may be objected that much of the material contained in this paper is outside the scope of the teacher of woodworking in the junior high school. While in our schools today science, mechanical drawing, history, mathematics, and design are taught as special courses by special teachers, the teacher of woodworking should be alert to apply not only these subjects but others in the curriculum to the teaching of his own subject. In this way only will the shop function in the present educational organization, and become a vital part of the organization. The shop work will help the other school subjects.

Little Arguments on Great Principles

WORDS VERSUS DEEDS

"Did you get a letter asking us to continue our little arguments on great principles Mr. Frills? Perhaps you are the author of the unsigned request I received asking for more of our profound discussions."

"No! No! Mr. Try Square; I hoped that our arguments of past years had so effectively established the great principles of The Industrial Arts in the minds of teachers, that like the beautitudes and the ten commandments they should never be questioned or forgotten."

"You flatter us Mr. Frills; I thought our little arguments died for want of breath. You know, Frills, that contention becomes anemic without action. Between the Latin people, who take their verbal and physical exercise together, and the Celtic people who, hit first and talk it over afterward, there is a happy medium which teachers should follow in and out of the classroom. In general we should talk less and do more, but since we must explain things occasionally, we should at least demonstrate each precept while it is fresh in mind.

"I wonder if a tax on talk in place of gasoline might not solve some of our social as well as our economic problems.

"I visited a deaf and dumb institution, recently, where the boys and girls were doing better work in the manual arts than some of my pupils do with all of their faculties."

"Yes!" mused the esthetic Mr. Frills; "there is truth and wisdom in what you say Mr. Try Square; but how about the poor teachers of language who would be obliged to go into the trades and industries if deeds were substituted for words? As for myself, I should miss the poets and singers in a voiceless world. Think of Spring without poetry and song."

"I can't think of it seriously, Mr. Frills, because I could never read poetry with patience, and as for singing, I am satisfied to let the birds do that; they know how and haven't much else to do.

"Do you realize, Mr. Frills, that modern inventions have made it so easy to talk that the world has almost run out of things to talk about? The telephone, telegraph, phonograph and wireless have supplied speech and song until the whole universe is listening in on a babel of jazz nonsense that goes in one ear and out of the other. If anything is said or written nowadays that is worth while, it is liable to pass unnoticed."

"Just so!" sighed Frills; "the art of presenting ideas has become difficult and complex, yet, I am convinced that Art will find a way.

"In place of making a loud noise the orator of the future must lower his voice and illustrate each conception with a signficant picture. I once heard the town crier of a little French hamlet ring a bell and bawl out the news to a group of interested citizens. Imagine the custom applied today, with a thousand town criers ringing a thousand bells and bawling a thousand bits of news on a thousand corners.

"Surely Art and invention have done something for us in giving us the privilege of hanging up the receiver. Besides, we have the movies where we can sit in the dark and see the panorama of events pass before us with only an occasional caption and the orchestra to disturb us. Art is the solution of our difficulties, Mr. Try Square, I am sure."

"Art!" sniffed the practical Mr. Try Square.

"I saw some noisy posters defacing a perfectly good building lot, as I came to school this morning. They were intended to advertise breakfast food, but they came nearer stopping digestion than promoting it. I suppose you would call that commercial Art."

"Brava! Bravo! Monsieur Try Square; You are 'coming along' as the Englishman would say. I am really glad that you suffered from those posters, for the first evidence of reform is to recognize error.

"If you are shocked by crude pictures, you must find relief in good ones. Art will be your salvation yet, Mr. Try Square."

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

DOC ORTHODOX

Our attention has been recalled to two matters of particular importance which the schools assume with the obligation of teaching. This recall of our attention comes in the nature of criticisms from persons who are not engaged in teaching boys and girls to the end that they may become effective artisans, tradesmen and citizens. All the more reason for our attention.

The charges are made that: first, our boys and girls are not acquiring the habit of systematic, thorough and orderly work in the schools; second, our boys and girls are not learning to be prompt.

We are reminded of one school executive, now gone to his considerable reward, who was a stickler for order and promptness.

We admired him for that and other fine qualities though we called him "Doc Orthodox" between ourselves and behind his back.

He used to come into our shop on unexpected inspection.

His critical eye would travel from bench to bench and then to the bulletin where the order of work for the day was posted, and we were painfully conscious as he left that he had secured at first hand the evidence of each pupil's standing and of our effectiveness as teachers. If the shop was disorderly, as it sometimes was, or if the project was not in prospect of being completed on schedule time, we were called to the office and reminded that order, precision and promptness were virtues of scarcely less importance than honesty. Over his orderly desk was the significant motto, "Time is not our own to waste."

Doc Orthodox used to reply to our appeal for more time to complete the program with the injunction, "If your program is too long for the time you have, cut it down but see to it that the brightest boy in the class has no time to watch the clock."

Teachers are sometimes given to boasting of the amount of work done by classes under their instruction. Young teachers are tempted to assign more work than can be well done in the hope of convincing their pupils and themselves that their course is not a snap course. The result of too much work is often a superficial and frantic effort on the part of the pupil to pass muster with as little study as possible. The impossible school program becomes a game of chance in which the wits of the pupil, who must make grades, is pitted against the wits of the vigilant teacher who must see to it that grades are earned. Such programs develop the gambler's instinct to get as much as possible for as little as possible. We have the impression that overloaded programs rather than snap courses lead many pupils to idleness and chicanery.

We also have the impression that no school work is easier of measurement in terms of time and skill than shop-work.

In shop-work a definite schedule can be maintained and the pupil's time and attention can be definitely commanded.

The response to criticisms against the schools, that the youth is not acquiring habits of promptness and thrift, lies in the careful estimate of time and work in the schedule and in strict adherence to a well balanced program.

May the shade of Doc Orthodox hover over us.

WHAT SHALL WE READ?

One of the most hopeful signs of the times, so far as industrial and vocational education is concerned, is the persistent call from shop teachers for assistance in selecting the proper reading material for general educational purposes. Shop men are no longer satisfied simply to study the problems of the shop. They are insisting on the right and the privilege of full participation in the intellectual, moral, and civic activities of the times. They demand the full responsibility of citizenship.

It is not enough that a man be informed with reference to his own trade or calling. He must come in contact with people of every possible line of work or profession. There must be some common ground upon which they can meet and think. There must be a great mass of thoughts and ideas that are the common property of all men, no matter what kind of work they do. That is the essence of democracy. The thoughts that have been engaging the minds of intelligent people through the ages have had to do with the welfare and happiness of humanity, the moral and spiritual problems of the individual, the problem of living together in a social organization, the significance of service, and the means and methods of government and education of a free people. Great works of literature, history, economics, government, sociology, and science deal with the struggles of humanity through all time, from serfdom to freedom, from ignorance to enlightenment, from autocracy to democracy, from antagonisms and hatreds to the brotherhood of man.

A new day is dawning when teachers of the various forms of practical education are seeking to know the great thoughts of the race, to read the best in all literature of all time, and thus to live in their daily tasks and contacts the *ideals* that alone can make a country or a life great. The personal libraries of some of the teachers and supervisors of industrial arts and vocational work are a delight to behold. Shakespeare, Scott, Elliot, Wells, Galsworthy, Van Dyke, Longfellow, Dewey, Mark Twain, and Wilson stand alongside the best there is in shop management, methods of shop instruction, units of construction, graphic aids, etc., etc. Such happy combinations of the idealist with the practical man will destroy egotism and narrowness and bring the day of the brotherhood of man a little nearer.

AMERICAN EDUCATION AND INDUSTRY

The primary purpose of education is to fit the youth for complete living and for the duties of citizenship. In its broader interpretation, education means

an adjustment to all the duties and obligations that make up life. It means a training for the vocations of life. Thus, education makes its contribution to industry, to commence, and to all the professional pursuits.

But, there is also a reciprocal action. The several occupations and professions contribute their mite to the cause of education. The contribution, for instance, made by industry to the successful operation of the school is in many respects a notable one. Industry here becomes an indispensable hand-maid to the business of a modern school plant.

The genius of the inventor, the skill of the mechanic, the constructive ability of the manufacturer, and the business enterprise of the distributor—all have made their contribution to the American school which at the present time excels in appointment and efficiency all other schools in the world.

And here it is not claiming too much to hold that man's greatest medium of communication, the printed page, has given both momentum and direction to the forces that have resulted in a beneficent service to the nation. That printed page has carried its message into the highways and byways, inspired ambition, encouraged laudable effort, and applauded worthy achievement.

Thus too, the teacher who has been on guard with a watchful interest, and who has given life and meaning to the pages of educational and trade magazines, by contributions to the philosophy and the method of vocational education and the industrial arts, may well rejoice in the part he has played in the great drama of human progress, and in the furtherance of education in America.

HABIT

Let us not minimize the importance of habit. The fact is that a very large part of education and of life is the acquiring of necessary and useful habits. No amount of information can possibly take the place of habit, which is acquired by experience and repetition.

Does the accustomed motorist remember the first time he tried to start his car after spending some hours studying a diagram of the car's mechanism and, book in hand, going through the mock movements of the process? He had the information. He knew exactly how it was done—turn the switch, open the choker, step on the starter, close the choker, step on the accelerator, throw out the clutch, etc., and the car moves slowly and smoothly, so the book says. But does it? He lays down the book, turns the switch, steps on the starter, and the noise of it throws confusion into his whole nervous system. He grabs frantically at the emergency brake, tries to shift without disengaging the clutch, steps on the accelerator, throws out the clutch, shifts to high, suddenly throws in the clutch, kills the engine, says something vigorous and impressive, reaches for his book, re-reads his lesson, and tries again—if he hasn't lost his nerve.

A few such efforts form certain habits which a little later manage the car skilfully and with but little conscious attention to the details of the mechanism or process.

In the mechanical world, there is an orderly process or method of procedure. A few repetitions of this procedure establish a habit, and habit formation is one of the essentials in all forms of industrial and vocational work. Habits will vary in degree and kind according to the purpose of the work.

There is such a thing as a method of thought that becomes habitual. There is likewise such a thing as a habit of orderliness. It will, of course, function chiefly in fields similar to the one in which it is acquired. For this reason, the formation of correct industrial habits for those who shall go into industrial pursuits is a very important matter.

A teacher of shop work should be very careful to determine what are the fundamental habits of a given line of work. Having determined this, he should strive to give as quickly and as accurately as possible at least the beginnings of such habits.

Art is not the plaything of opulence. It is true equality of opportunity. It is true democracy, knowing nothing of caste, class or rank. It may bestow its choicest gifts upon utter poverty; it may deny them entirely to great wealth.—*Otto H. Kahn.*

Tell a man how to do a thing, and he will not know how to do it; show him how by doing it before his eyes, and he still will not know how to do it. The only way for him really to learn is by doing it himself.—*Dr. Seaman A. Knapp.*

We are believers of art. We buy it, we surround ourselves with it, we sell it, we create it, we pass on its message with every gift we make. Therefore, let us resolve to know more of it, to live it with our children, and to build strongly now for those who are to follow.—*Royal B. Farnum.*

CHANGE NAME OF MANUAL TRAINING DEPARTMENT

On March 12th the superintendents of Los Angeles, in conference, changed the name of the manual training department to that of *Manual Education Department.*

In commenting on the change, Mr. C. A. Kunou said: "This change in nomenclature has a more important and far reaching significance than may appear at first sight. It excludes from its meaning the many erroneous assumptions, frequently attached to the various terms—manual training, industrial arts, pre-vocational training, sloyd, manual arts, etc.

"The name manual education indicates the content and objective in the same way that physical education, visual education indicate kind and objective. Now while there is only one education, namely the education of man in a generic sense, yet education includes various activities and these activities are all governed by the same principle. Each has a specific objective which contributes to the one general objective.

"The decision and action by the superintendents is an effective and wise administrative stroke. It is the first time this name has been officially adopted so far as is now known. It will carry with it the unfoldment of the true and right idea of manual education and will undoubtedly become universally adopted. It will unfold new interpretations and open new visions to supervisors, teachers, pupils and patrons. The name Manual Education Department will hereafter be used on all official documents."

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, pattern-making, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

A JOB SHEET FOR THE HOME MECHANICS OR WOODWORKING SHOP

F. E. Tustison, The Stout Institute, Menomonie, Wis.

There is not a lack of material on hand-carving, but as yet it has not been reduced to the unit lesson plan. In the issue of the INDUSTRIAL ARTS MAGAZINE for August, 1920, there appeared a splendid article on the process. Perry in his book on "Seat Weaving" gives thorough details of the seven step weave, as well as other methods of chair seating and re-seating. The following job sheet was worked out and condensed to fit the single unit lesson sheet. A second sheet describing the boring of holes for both old and new layouts, is also available. The sheets are being used in teacher training work at the Stout Institute.

Chair cane is available from several dependable supply houses. It is possible that schools located in the larger cities can obtain the cane locally.

Job Sheet
Home Mechanics (Woodwork)
The Stout Institute
F. E. Tustison

Job Specifications: To re-seat a hand-caned chair.

Reason for Job: Most every home possesses hand-caned furniture. Continual wear breaks the small strands of cane and in a short time the whole panel sags and gives way. It is often difficult to find a professional who devotes his time to such repair. The energetic boy at home can do the job and preserve the chair for further use.

Material: Cane and water.

Tools: Knife, and small wooden pegs.

Procedure: (1) Mark both ends of a central strand of step I (See Step I in Fig. I). If the seat is round or irregular this will aid materially in getting the cane back in the same order. It might be well to also mark a central strand running from right to left (Step II). Be sure to mark both ends of the strand.

(2) Remove the old cane. With a sharp knife remove the old cane and clean out all the holes. If the chair is to be refinished, do it at this time. Preserve any reference marks that you made for the central strands.

(3) Select the cane and soak in water. Fine and medium cane are the sizes generally used for average work. The width of these is about ⅛". Use common binder which is slightly wider for step No. 7. Soak for ten minutes in warm water or longer in cold.

(4) Cane Step 1 (See Fig. I). Start up through the marked central hole in the back and fasten with a wooden peg. Cross and go down through the central hole in the front, then up through the next hole. Cross and go up and down as before. Keep the smooth side up and do not pull very tightly. Work both ways from the center, splicing (See Fig. II) when the end of a strand is reached. Use wooden pegs to hold loose ends until splice can be made. When you do not wish to splice on a new strand, tie as in Fig. III. Note, that in step 1, all the strands run in the same direction and are the same distance apart. On irregular panels it is often necessary to skip holes in order to keep the strands equi-distant.

(5) Cane Step 2. Step 2 is run at right angles and over step 1. Proceed as in step 1. Figure IV shows step 2 being caned.

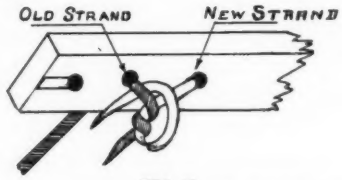


FIG. II.
SPLICING BELOW THE FRAME.

(6) Cane Step 3. Proceed as in step 1 and run over step 2. The strands in step 3 are run in the same direction and in the same holes as step 1.

(7) Cane Step 4. (Examine Step 4 in Fig. I carefully.) Here you begin to weave. Run in the same

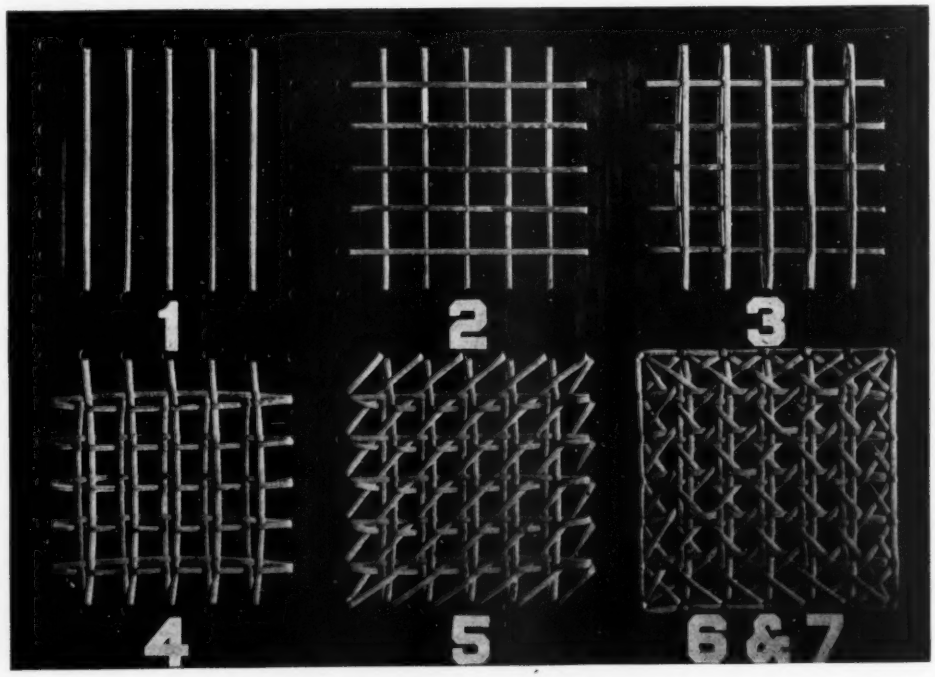


FIG. I. SEVEN STEP CANING.

direction as step 2 and in the same holes. Go over and under as per photograph. Work with one hand below and the other above the frame. Always run on the same side of the strands of step 2. A dull knife will help in weaving at the edges. **Have the first two strands of this step checked by the instructor before you go ahead.**

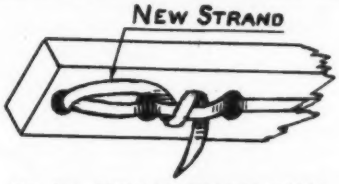


FIG. III. TYING TO FORMER LOOPS.

(8) Cane Step 5 (First set of diagonals). Run over two strands and then under two. Note the correct and incorrect method for this step in the drawing (Fig. V). Use one hand under and one hand over the frame. Diagonals are run into the holes tending to pull them the straightest. Two diagonals may run in the same hole or several holes may be skipped in order to accomplish this. **Get a check from your instructor for the first strand.**

FIG. IV. CANING STEP 2.

(9) Cane Step 6 (Second set of diagonals). Run same as step 5 but at right angles. **Get the instructor's check for your first strand.**

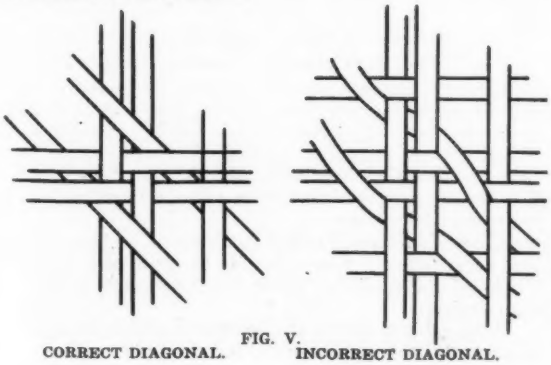


FIG. V.
CORRECT DIAGONAL. INCORRECT DIAGONAL.

(10) Cane Step 7 (Binding). Use same cane as in other steps to secure the wider binder. Come up through hole, over the binder, and down through the same hole. Pull tightly and repeat at every hole. If cane inserts with difficulty, use a scratch-awl or nail to open the hole. Over-lap the binder ends when the circle is complete.

Questions: (1) What is cane? (2) Why is cane dampened while weaving?

References: Perry—Seat Weaving; Wood & Smith—Prevocational and Industrial Arts, pp. 62-65.

Record:

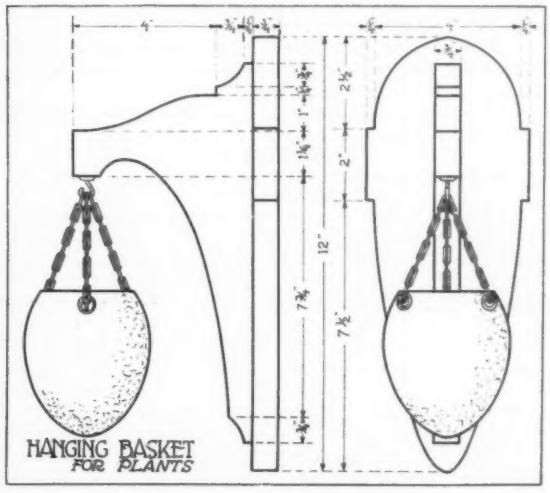
Name..... Class.....
Date begun..... Date finished.....
Have you answered all of the questions?.....
Instructor's Grade.....

HANGING BASKET FOR PLANT MADE FROM COCOANUT SHELL

R. A. Pottsmith, Vocational High School, Virginia, Minn.

While searching for new projects of interest suitable for classes in high school woodwork, I developed this novel hanging basket. I say it is novel because the bowl is made of a polished cocoanut shell and gives the fixture a "what is it?" appearance.

The bracket can be made of any suitable wood and the design may vary, but if you change the design, remember to allow plenty of freedom around the bowl for the growing plant. A bracket built of two pieces screwed together after being sawed out, sandpapered, and stained, serves very well.



DETAILS OF HANGING BASKET.

When selecting a cocoanut, pick out one of good shape and as near perfect as possible. Saw off the end with the "eyes" and take great care in prying out the meat so as not to crack the shell.

By using a coarse wood rasp, coarse sandpaper, and finishing up with fine sandpaper, the shell can be polished to the point where it takes on the appearance of burled walnut. A good polishing with furniture wax will darken the color and give a permanent finish.

The inside of the shell should be warmed as much as possible by holding over the flame of a blow-torch. Then pour in melted parafine wax and give the inside a good coating of wax to render it waterproof. Warming the shell seems to give the wax a better hold and it does not scale off. I have also used a small glass dish inside of the shell, but even then it is a good idea to use wax, because water spilled into the shell will surely crack it.

The three small cup hooks are fastened to the rim of the shell by boring three evenly spaced holes large enough for the screw to pass through easily. Cut small lead washers about $\frac{1}{8}$" thick and $\frac{3}{8}$" in diameter and drive a small nail through the centers; tap threads into these holes by using one of the cup hooks as a tap. Snip off

A HANGING BASKET.

the points of the cup hooks after they are drawn up tight and true. I tried screwing the hooks directly into the shell but, "experience is a good teacher." A piece of small brass jack chain, 12" long, cut into three pieces looks well.

The green of the growing plant blends well with the brown shell and bracket and—well, make one yourself and see how it looks in your home.

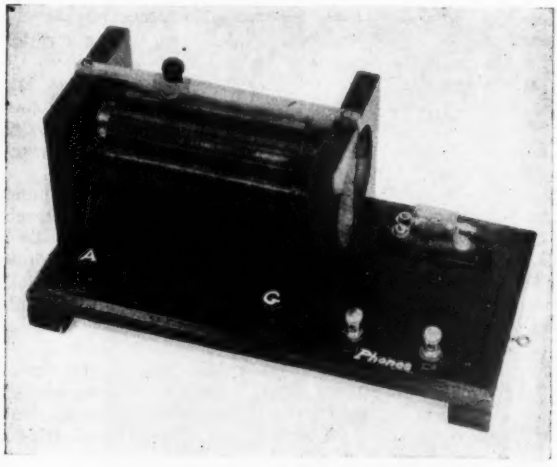
The photograph shows the finished problem planted with a vine commonly called "Wandering Jew".

A CRYSTAL SET

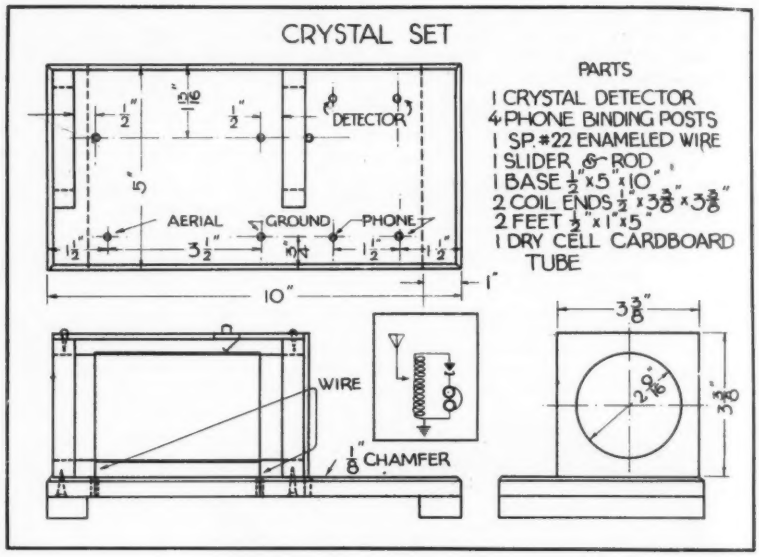
Arthur O. Gardner, Emerson Junior High School, Madison, Wis.

Probably many manual arts instructors in the junior high schools have tried to make crystal sets described in radio magazines with the idea of adapting a set as a regular project. I have tried out quite a few myself. I could usually get a fairly good looking and good working set as my model, but, upon analysis of the various tool processes and skills required in making the set, I found the problem too difficult for the seventh grades. I have had classes try them and the results were not very satisfactory from the standpoint of a commercial product. Some of the jobs which caused trouble were as follows: (a) winding a tapped coil, (b) attaching tops to switch points, (c) attaching a coil wound on a tube to the set (this was the worst problem), (d) finishing the set.

The set illustrated here eliminates most of the difficult jobs, or reduces the difficulty of some operations encountered in building most sets. Instead of using a tapped coil, a slider and rod were used so that taps, switch points,



CRYSTAL RECEIVING SET.



DETAILS OF CRYSTAL SET.

and switch levers may be avoided. The tube used to wind the coil on is an ordinary dry cell cardboard case, usually 2 5/16" in diameter and 6" long, very easy to get in this radio age. This tube is small enough in diameter so that it can be fitted into instead of against or onto coil ends.

Every manual arts shop has an expansive bit which is all that is necessary to fit the coil into the coil ends. Other sets usually require circular discs or wheels fastened into the coil, and these in turn are fastened onto the coil ends. The coil is wound to within one inch of each end of the tube, thereby giving the slider enough room to touch the wires on either end of the coil. The coil is wound by hand. Be sure to have tension on the wire while winding. After the coil is wound it should be given a coat of collodion or shellac.

The coil ends, base, and feet should be completed and assembled and all the holes drilled for binding posts and detector. Then the coil should be finished by staining and shellacing. After it is all finished and perfectly dry, put the coil in the ends, attach the detector and the binding posts, and connect up the whole set underneath the base. To those who cannot read the hook-up, connect as follows:

1. Connect aerial binding post to slider rod.
2. Connect one end of coil to one side of detector.
3. Connect other side of detector to one phone post.
4. Connect other phone post to ground.
5. Connect other end of coil to ground.

Tune by finding a sensitive spot on the crystal and by sliding over coil to the turn of wire where intensity or volume is greatest. Be sure to scrape the surface of the wires on the coil, which are in the path of the slider, perfectly clean so that good contact is assured at every turn.

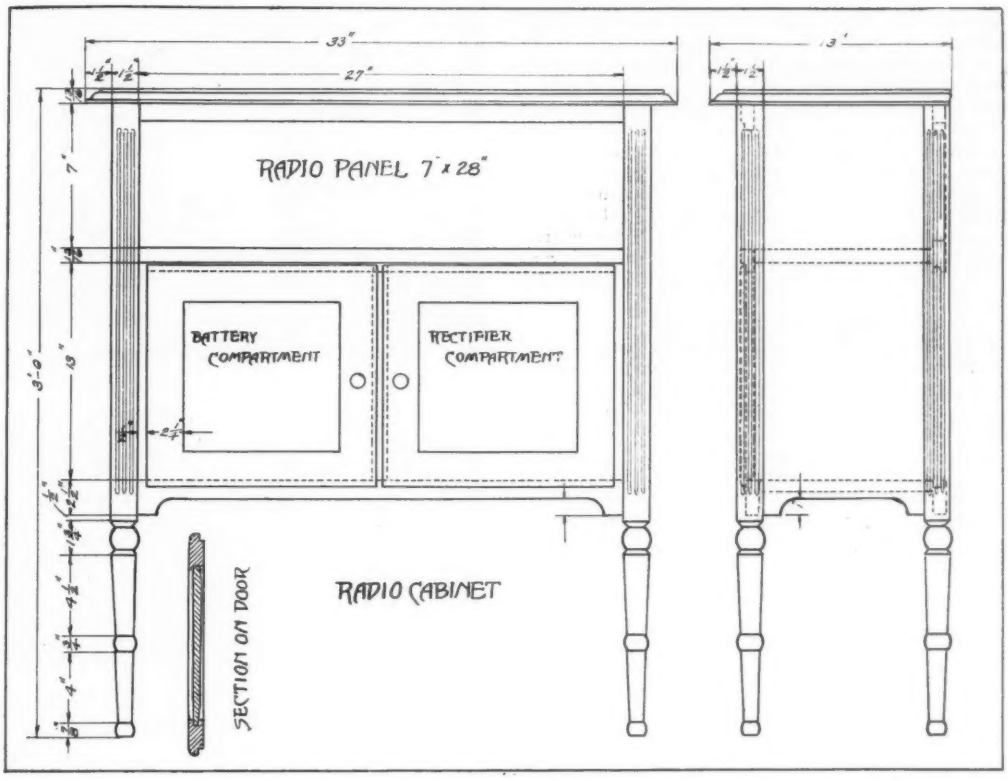
RADIO CABINET

Geo. H. Wichmann, Coleraine, Minn.

Among the large number of successful manufacturers of radio receiving sets there are but few that have given the proper housing of radio accessories any consideration. The receiving set proper is usually built in a presentable case, but batteries, head sets, etc., clutter up the table so that the average receiving room greatly resembles an experimental laboratory.

The cabinet itself offers an excellent problem in cabinet construction. Since it adds to the beauty and efficiency of the receiving set it ought to prove a welcome shop project.

The cabinet shown in the drawing was designed to house a five-tube neutrodyne, together with storage and



DETAILS OF RADIO CABINET.

B battery, rectifier, etc. The dimensions can, of course, be varied to suit the receiving set. Also the construction of legs, doors, etc., may be simplified to meet the abilities of the student.

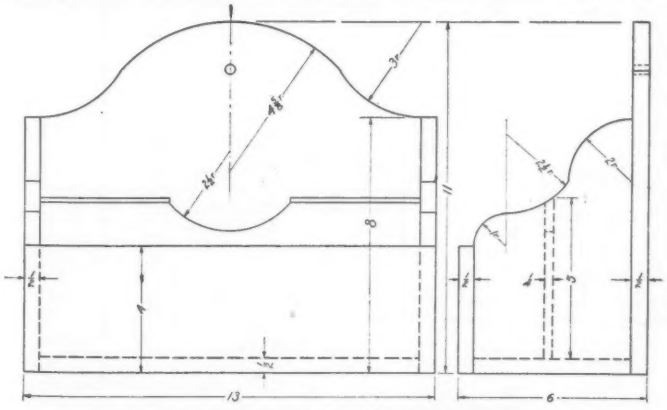
A PRACTICAL SYSTEM FOR USING MAGAZINE DRAWINGS

Kenneth R. LaVoy, Instructor of Industrial Arts, New Rochelle, New York

When I first became a subscriber to the "Industrial Arts Magazine" every copy seemed so valuable that the thought of cutting up the mazagine appeared wasteful and extravagant. So I saved every copy, and at the end of each year had them bound. But somehow the valuable hints and suggestions that I knew were contained in these previous volumes were never at my fingertips when wanted, and when I desired to use some drawing in my shop, as I often did, it was necessary for me to redraw the project. With a heavy schedule of work, time for doing drawings was scarce, and so I cast about for some means of making these magazine drawings available for use in the shop. When I took the magazines to the shop and worked directly from them, they soon became mutilated and dirty from constant handling. Finally I thought of and adopted the following plan which has proved most satisfactory:

I bought several note books of the loose-leaf type, of uniform size, and assigned to each a department or special subject. Thus one book was labeled "Mechanical Drawings and Drawing Information", another "Woodwork—Furniture, Bench Problems, Staining, etc.", another "Sheet Metal", another "Art Craft Work", one "Theory and Outline of Courses", etc. And then I began saving the cardboard backs from large and small school tablets.

The system functions as follows: Each month I read over my copy of the magazine very carefully, especially the editorials and special articles, and the articles that are of particular interest to me as an industrial arts teacher. After this the scissors come into play, and I soon clip out many priceless drawings and articles. These I paste in their special note books. The drawings are divided into two groups. Those which I want to have in my shop for my own use and the use of my pupils are placed to one side; the others are pasted into Note book No. 1. The first group of drawings are then pasted on the tablet backs, both sides of the cardboard being used. They are then numbered and an indexed record is made in a small book. (thus "Sailing Boats" would be card No. 26), the next morning I take these cards to the shop and give them a coat of thin white shellac. When dry they are ready for use, and will stand a great deal of rough handling and still be easily readable.



DETAILS OF FILE FOR MAGAZINE DRAWINGS.

I have a small file which I have made to hold these drawings, and keep it filled with cards containing suggestive projects. The

file is divided into two compartments—the one in front holds the small drawings which have been pasted on the cardboards from the small tablets; and the back compartment holds the larger drawings.

These drawings, combined with my blueprints, give me an inexhaustible supply of practical and interesting projects, so that the time spent in keeping the note books up-to-date and in pasting the drawings on the cardboards is not wasted; and now I have all information readily available where it can be easily looked up. I feel that my magazine is infinitely more valuable to me than formerly, and I know that it is doing its bit toward making my work more worth-while and broadening the scope of the shop activities.

AN IDEAL GROUP PROJECT

Supt. Chas. B. Woodstock, Mondamin, Iowa

The Mondamin, Iowa, consolidated school district owns as a part of its school plant, four city lots in a tract adjoining the school property. One of the old one-room rural schoolhouses has been moved onto this tract and remodeled into a comfortable home for the superintendent. Until recently there was a rambling old barn on the property, badly out of repair and almost useless. The superintendent had a car and wished to keep a cow and some hens. Here was a splendid problem for the manual training class.

Early in the fall of 1924 the permission of the school board was obtained for the wrecking of the old barn by the class and the construction of such buildings as would best meet the needs at the superintendent's home.

A class of nine ninth-grade boys entered with zest into the solution of the problem. The situation was novel and the weather ideal for out-of-doors work. For six weeks the schedule of classes was arranged so that double time was spent in manual training, and the boys could work half days on the project. Careful plans with specifications for the new buildings were drawn—a fine study in size, arrangement, design, location, relation to other buildings, etc. These were submitted to the board for approval.

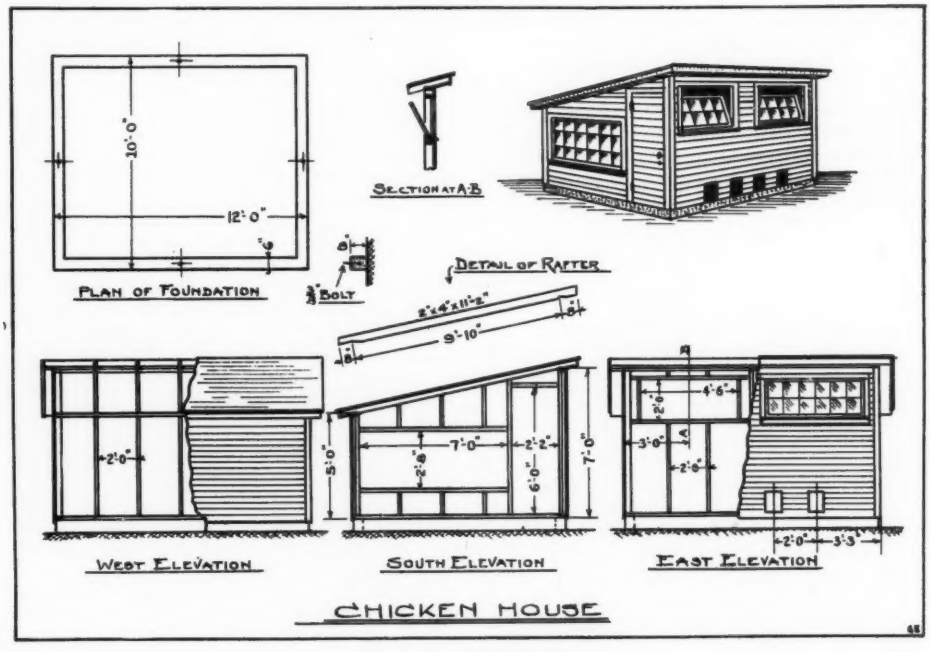
The buildings decided upon were a barn, 16′ x 16′, with 12′ eaves, for the cow and car, with a loft overhead for hay. A separate hen house, 10′ x 14′, was planned. Because it suited local conditions best, the walls of the hen house were made in four sections in the school shop and later assembled on the foundation. The placing of

(ABOVE) A MANUAL TRAINING CLASS AT MONDAMIN, IOWA, ERECTING A BARN. (BELOW) STUDENTS CONSTRUCTING A HENHOUSE.

the concrete foundations and floors afforded some fine practical experience with varied materials, as did also the framing of the barn, the cutting of rafters, shingling, cutting and hanging doors, framing of windows, and putting on the trim.

Almost every scrap of the old barn was used in the making of the new—a good lesson in practical economy of materials. Fresh lumber was not used where the old was suitable.

The result is a pleasing and convenient arrangement of out-buildings, secured at small cost to the district. The



DETAILS OF CHICKEN HOUSE.

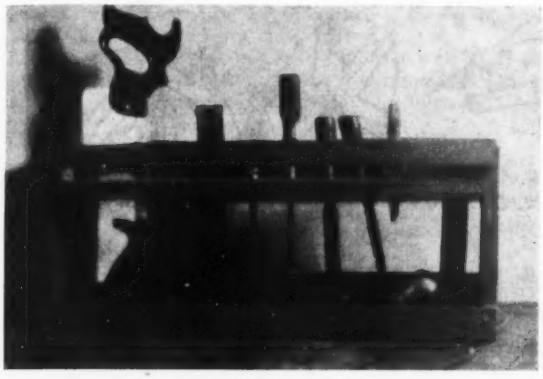
boys have learned a most valuable lesson in practical carpentry, and the product of their effort is a source of much community interest and pride.

The accompanying drawing indicates the plan and construction of the hen house, while the kodak views show the work in progress. Mr. Kenneth R. Rowley is the instructor.

TOOL DISTRIBUTION IN THE SCHOOL SHOP

H. D. Smith, Nyack, N. Y.

Checking tools in and out for class work is a definite problem confronting every manual training teacher or shop instructor. Many methods have been formulated and tried, but of this number only a very few have enough followers to be termed successful. Years ago, the chief means of tool distribution was to supply each bench with the usual tools for shop use, and make the inventory of tools by observation of the benches at the close of each

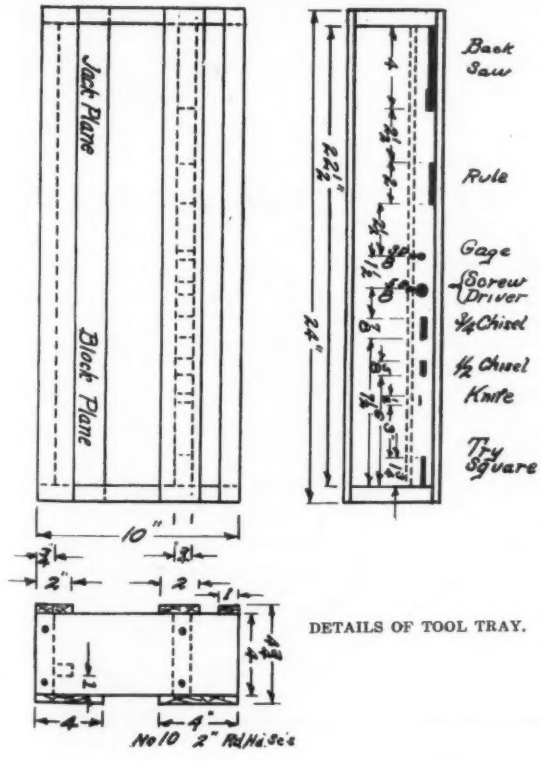


TOOL TRAY.

period. Of late years the toolroom method has been the one most generally used. Every up-to-date shop had its tool-room, with a tool clerk in charge to pass out the tools and check them in at the close of each period.

There are, however, several reasons why these methods named above, do not meet the needs of the school shop today. In the first place, tools look attractive to some boys. Even though the door may be securely locked, the members of the school board feel better if the tools are also securely locked in a tool-room or cabinet There is little doubt but that the tools are better off in some place not plainly seen from the school windows after school hours. To some teachers also, the appearance of the shop is much more attractive if the tops of benches are clear of tools at the close of each day. These facts have contributed toward the popularity of the tool-room method of caring for tools. This method also has its faults which are not easily overcome.

The plan of keeping all of the tools in the tool-room or cabinet, and checking them in and out, is not efficient as a time saver. To take five minutes at each end of a period to care for tools is expensive, especially when the period for work is short as it is with most manual training classes. One boy's regular work is held up each period to take care of tools. A definite schedule must be worked out so that all of the boys will have equal opportunity at the bench and in the tool-room. In addition to the time this method requires, the tools are frequently dropped when carried to or from the benches. Thus, sometimes expensive tools are broken or keen-edge tools dulled.



DETAILS OF TOOL TRAY.

NYACK PUBLIC SCHOOLS - TOOL RECORD SHEET

TOOLS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Jack Plane															
Block Plane															
Try Square															
Back Saw															
Marking Gage															
Rule															
Screw Driver															
Chisel, 1/2"															
Chisel, 3/4"															
Marking Knife															
Pupil's Name or Shop No.															
			INVENTORY OF GENERAL TOOLS												
Hammer															
Rip Saws															
Cut-Off Saws															
Chisels			(Note--An incomplete list of												
Gouges			general tools is given on												
Braces			this sheet because of lack of												
Bits			space. The regular record is												
Drills			placed on a longer piece of												
Countersinks			paper.)												
Sc. Dr. Bits															

TOOL RECORD SHEET.

The following plan has, however, proven its value during a considerable length of time in the author's shop. It embodies the better qualities of both the old standard methods and eliminates many of the faults. With this method of tool distribution a tool tray, such as is shown in the accompanying photo and sketch, provides an efficient means of carrying tools. It secures a convenient place for each tool during the work period and it offers a speedy means of checking the inventory of tools. These trays can be quickly passed out at the opening of work and checked up by the tool clerk; or they may be placed on the respective benches before school by the instructor and taken in by him at night. In either case the condition and number of all tools is readily learned. The tools are left in the trays when not in use, in the tool-room, as well as outside. No time is wasted looking for separate bench tools. They are always together and always ready.

As an additional record of a more permanent type, the "Tool Record Sheet" is used. On this sheet is the list of tools in each tray, and in another place, the more general tools used less frequently and which cannot, therefore, be placed in each tool set. Below the list of tools is placed a space in which may be indicated the person using each set. A class number in place of the pupil's name saves the writing of the name, but records the user equally well.

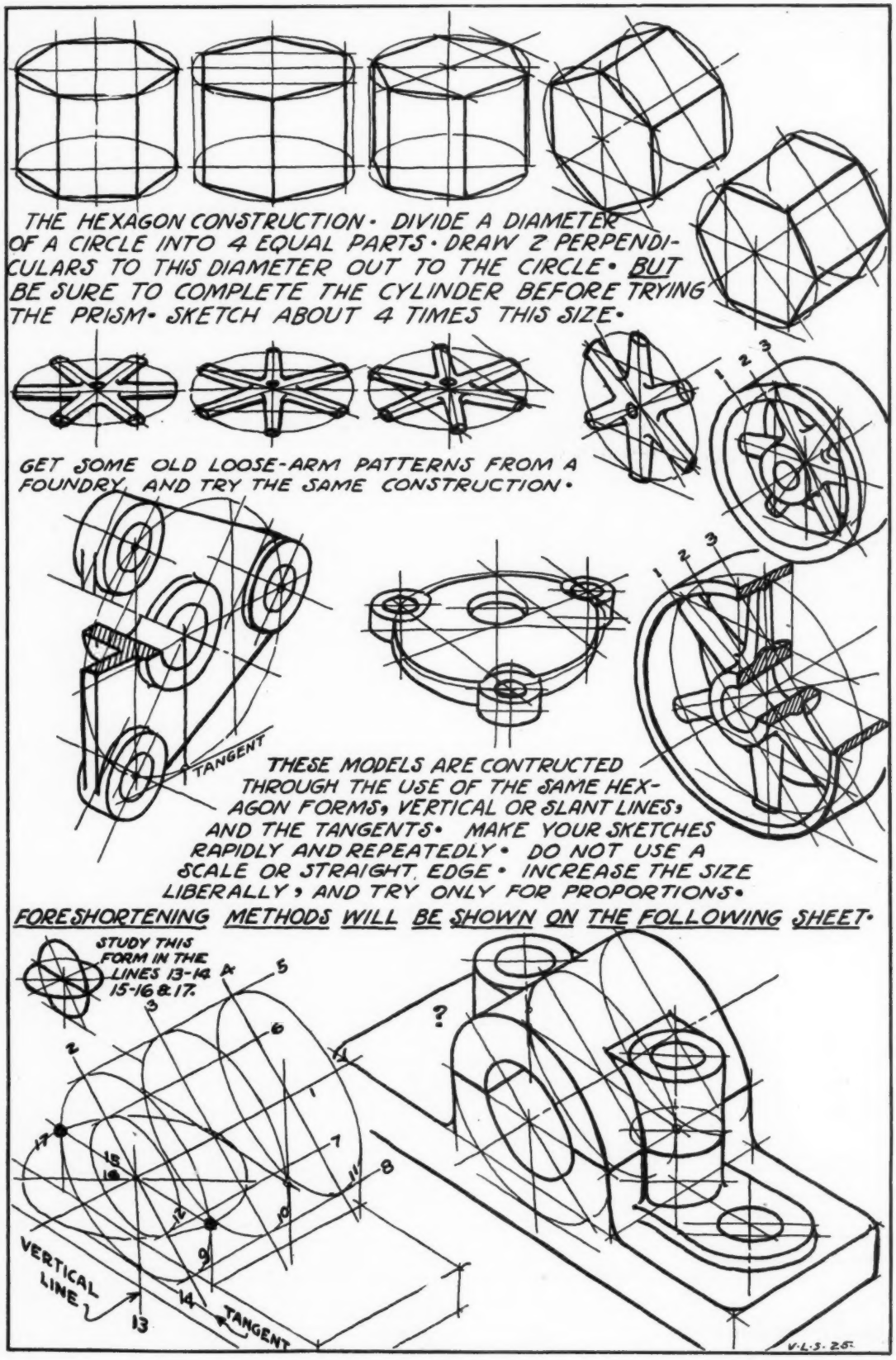

THE HEXAGON CONSTRUCTION · DIVIDE A DIAMETER OF A CIRCLE INTO 4 EQUAL PARTS · DRAW 2 PERPENDICULARS TO THIS DIAMETER OUT TO THE CIRCLE · BUT BE SURE TO COMPLETE THE CYLINDER BEFORE TRYING THE PRISM · SKETCH ABOUT 4 TIMES THIS SIZE ·
GET SOME OLD LOOSE-ARM PATTERNS FROM A FOUNDRY, AND TRY THE SAME CONSTRUCTION ·
1 2 3
TANGENT
THESE MODELS ARE CONTRUCTED THROUGH THE USE OF THE SAME HEXAGON FORMS, VERTICAL OR SLANT LINES, AND THE TANGENTS · MAKE YOUR SKETCHES RAPIDLY AND REPEATEDLY · DO NOT USE A SCALE OR STRAIGHT EDGE · INCREASE THE SIZE LIBERALLY, AND TRY ONLY FOR PROPORTIONS ·
FORESHORTENING METHODS WILL BE SHOWN ON THE FOLLOWING SHEET ·
STUDY THIS FORM IN THE LINES 13-14 15-16 & 17.
VERTICAL LINE
TANGENT
?
V·L·S·25

PLATE 2. (See Plate 1 in April Magazine.)

PERSPECTIVE DRAWING, II

V. L. Sherman, Lewis Institute, Chicago

The methods employed in these sketches may have some claim to originality. These methods were first brought to my notice when studying engineering under Mr. Charles Schenk at the Lewis Institute a good many years ago. Mr. Schenk was first of all an engineer, just what I wanted to be. His predecessor was Mr. Hatch, later with the Stout Institute, also an engineer. What they were after was a means to an end. And they were the first to prove to me that thinking in bulk through the medium of perspective sketching was worth a great deal. It could be accurate and rapid.

After leaving school that sketching stuck so well in my head that I made excellent use of it with eight different jobs in engineering. Two or three new "tricks" were added, but the original scheme of forgetting the picture part and resorting to pure construction has never changed. Such sketching is really just as mechanical in method as laying out work on a drawing board.

I found that as a young fellow I never was at a loss for work and concluded that it was ability to sketch and think in three dimensions. It saved an endless amount of "monkey work" on the drawing board.

A COURSE IN ELEMENTARY CABINET MAKING

Outlined by J. A. Shelly, Vocational Department, Public School, No. 32, Jersey City, N. J.

(Continued from April)

(1) CARCASE FRAMING FOR CLOSETS, CABINETS, BOOK CASES, ETC.
- (a) Top and bottom fastened to sides with butt joints.
- (b) Top and bottom fastened to sides with rabbeted joints.
- (c) Top and bottom fastened to sides with dadoed joints.
- (d) Top and bottom fastened to sides with stopped dadoed joints.
- (e) Bottom dadoed to sides and sides housed into top.
- (f) Partitions dadoed into top and bottom.
- (g) Front framed for doors.
- (h) Front framed for drawers.

(2) TABLE CONSTRUCTION

Table Legs
- (a) Squared.
- (b) Tapered 4 sides.
- (c) Tapered 2 sides.
- (d) Squared and tapered.
- (e) Splayed.
- (f) Turned.

Framing
- (a) Apron doweled to legs.
- (b) Apron mortised and tenoned to leg.
- (c) Apron butt jointed to legs and legs bolted to corner blocks.
- (d) Drawer rails dovetailed to legs.
- (e) Bearer rails mortised and tenoned to legs.
- (f) Drawer slides and runners.

Tops
- (a) Butt jointed.
- (b) Doweled.
- (c) Matched.
- (d) Battened.
- (e) Lined to thicken edges.
- (f) Extension.
- (g) Molded edge.
- (h) Drop leaf.

Fastenings
- (a) Screw pockets.
- (b) Counterbored screw holes.
- (c) Buttoned (Metal or Wood).
- (d) Ledged and screwed.

(3) CABINET DOORS
- (a) Doweled frame.
- (b) Mortised and tenoned frame.
- (c) Mitered frame.
- (d) Stiles and rails rabbeted for panel or light.
- (e) Stiles and rails grooved for panels.
- (f) Molded edge sash.
- (g) Planted moldings on edges of rails or stiles to hold panels or lights.

(4) CABINET BACKS
- (a) Solid back. (One piece of plywood.)
- (b) Tongued and grooved. (Beveled or beaded edges.)
- (c) Vertical panels and muntins. (No rails.)
- (d) Horizontal panels and rails. (No stiles.)
- (e) Framed and paneled. (Mortised and tenoned or doweled.)

(5) DRAWERS
- (a) Sides rabbeted to front, back dadoed to sides and bottom fitted to groove.
- (b) Sides rabbet—dadoed to front, back dadoed to sides and bottom fitted to groove.
- (c) Sides dovetailed to fronts and backs.
- (d) Fronts shaped.
- (e) Partitions stopped dadoed to sides or to backs and fronts.

(6) TRIMMING
- (a) Crown mold. (Solid or built-up.)
- (b) Base boards.
- (c) Shaped rails.
- (d) Panel moldings.
- (e) Face moldings.
- (f) Astragals.

(7) SHELVING
- (a) Fast. (Cleated or dadoed.)
- (b) Adjustable. (Metal shelf blocks, wood racks and loose cleats.)

(8) HARDWARE
- (a) Strap hinges.
- (b) Box and chest hinges.
- (c) Door butts.
- (d) Screen hinges.
- (e) Drawer locks.
- (f) Face locks.
- (g) Mortised locks.
- (h) Drawer pulls.
- (i) Escutcheons.
- (j) Elbow catches.
- (k) Spring catches.
- (l) Bolts.

(9) FINISHING
- (a) Sanding. (Flat and shaped surfaces, moldings, etc.)
- (b) Scraping. (Flat and shaped surfaces, moldings, etc.)
- (c) Filling. (Liquid, Paste.)
- (d) Staining. (Oil, Water, Spirit.)
- (e) Varnishing.
- (f) Polishing.
- (g) Rubbing. (Sandpaper, Pumice Stone, Rotten Stone.)
- (h) Fuming.
- (i) Painting.

An Elementary Course in Millwork

General Instructions: The student must learn to take orders and execute them. He should try to develop the faculty of observation by taking some interest in the other operations going on about him in the shop. This will broaden his knowledge of the work as a whole by giving him an idea of the appearance of the project in its completed state without actually working on each and every process. He must learn to think through his job from start to completion. He should be able to picture the complete job and have a clear understanding of how to proceed before actually beginning an operation.

Accuracy: The value of accuracy should be emphasized. All orders should be examined carefully and all specifications read from beginning to end. The dimensions given should be read twice and the figures adhered to.

Planning Work: Try to plan your work so that you will have something else to do when the machine you need is in use. Very often the same operation may be accomplished on some other machine. If a certain machine desired is in use ask the operator to notify you as soon as he is through. While waiting for the machine, proceed with the next operation, or make plans for going on with it.

Stock Orders and Lumber: Standard rough and finished dimensions of lumber are in thicknesses:

Rough	Dressed
1″	⅞″
1¼″	1⅛″
1½″	1⅜″
2″	1¾″

Lumber usually comes in random widths and in lengths of 10, 12, 14 and 16 feet.

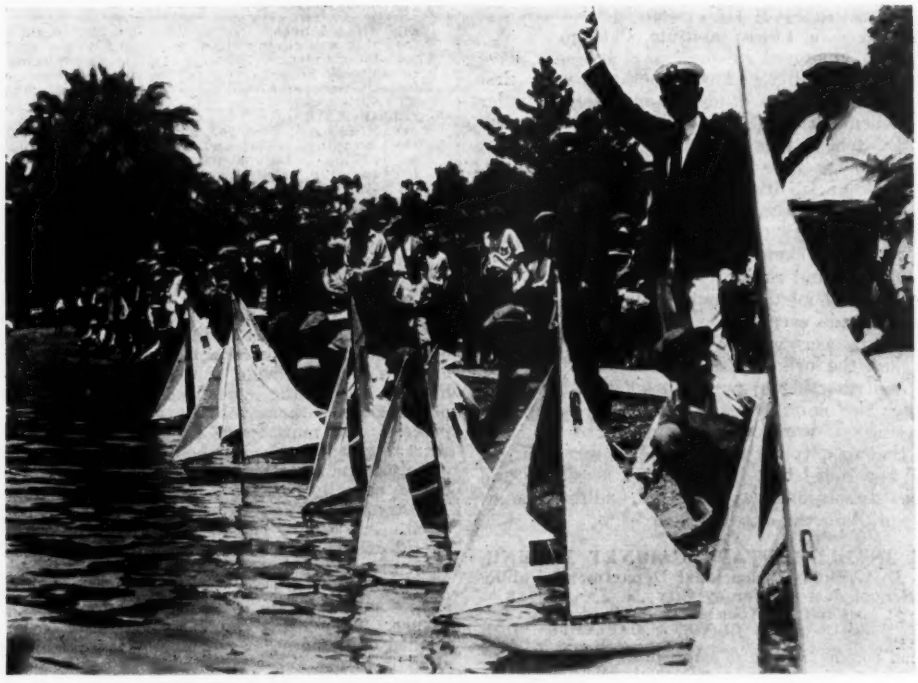
The sequence or order in which stock should be listed is Thickness, Width and Length. The thickness and width should be listed in inches and the length in feet and inches. The stock list should give the finished or dressed dimensions.

No. of Pieces	Thickness	Width	Length	Material
12	⅞″	6″	8′ 2″	Chestnut
5	1⅝″	30″	4′ 6″	Poplar

Machine Procedure: Rough cut all the large pieces of stock first and use the cuttings for the smaller pieces. A minimum allowance of ⅜″ on the width and ¾″ on the length should be made for milling. Rough cut all stock for a complete job at one time and complete all mill operations on a given machine before leaving it. Mill all stock of like dimensions before changing the set up of a machine. A machine can never be set up to exactly the same size twice; there will always be a slight variation. Pile the stock to be milled on horses to one side of the machine, and keep the milled stock off the floor so that it will not be damaged by having the faces or sharp edges bruised. Always mark the face sides and face edges of the stock, and be sure to work to these marks. The fitting and assembling can only be accomplished by working to corresponding face marks on each and every piece. Before changing the set up of a machine, make sure that it is no longer needed by the operator who preceded you.

General Machine Cautions: It is important that the following rules be carefully observed in order to guard against accidents. A student is forbidden to use any machine unless permission has been obtained from the instructor. Clear the table or bed of the machine with a brush, or a light flat stick, before turning on the power; if it becomes necessary to clear it again while it is running use a stick for this purpose. Keep the floor around the machines free from cuttings and stock; there is danger of slipping or tripping on or over small pieces allowed to remain on the floor and accidently throwing the hand against the saw or knives. Talking to an operator working on a machine is a very dangerous practice and should not be indulged in. Keep your eyes on your work at all times when passing it over or through a machine.

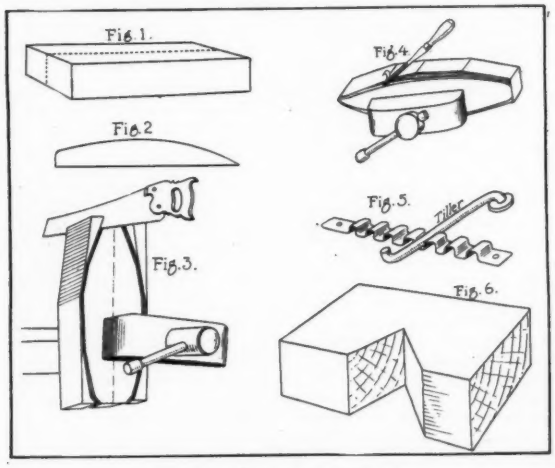
(To Be Continued)



READY FOR THE GUN.

BOAT BUILDING IN LOS ANGELES

The building of model yachts has been an interesting and most successful part of the manual training work of the Los Angeles elementary schools during the springs of 1923, 1924 and 1925. The work organized by Mr. Charles A. Kunou, supervisor of manual training, has been supported by local yachtsmen and newspapers, and has attracted wide, general interest among teachers and pupils, and in the community at large.



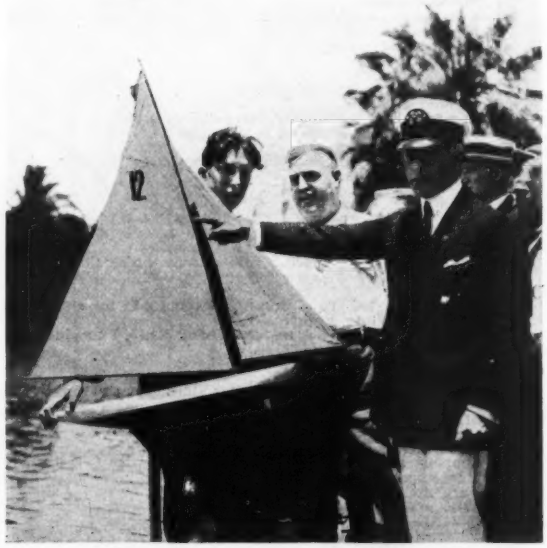
TYPICAL DETAIL DRAWING
Issued by Mr. Kunou as a help for the Boat Building Contest.

The work as carried on has been motivated by a prize contest arranged by the Southern California Yachting Association and the Los Angeles Model Yacht Club. The flag officers of both organizations officiated in the annual model yacht regattas and in the distribution of prizes. The Los Angeles Evening Herald provides trophies each year, and gave the contests considerable publicity.

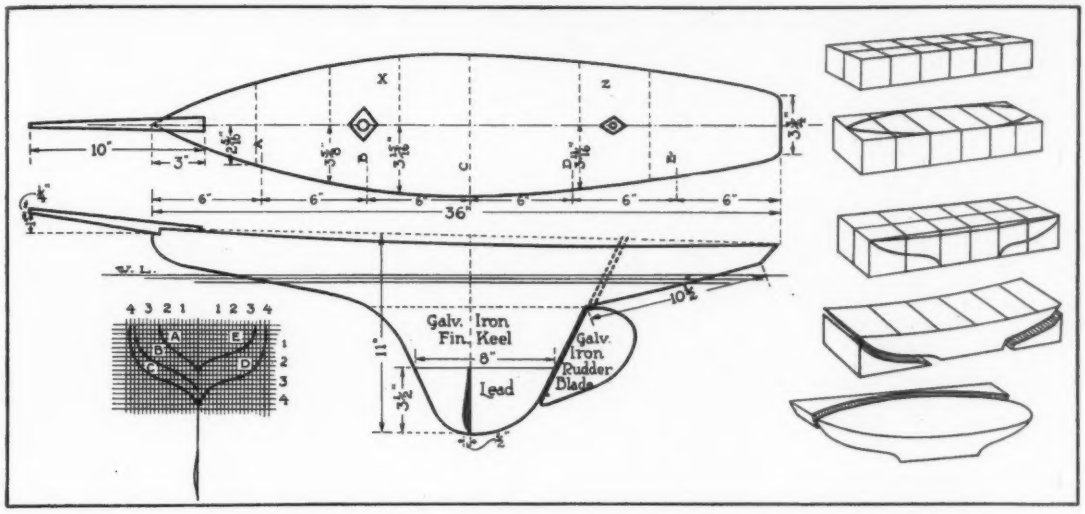
The contest was announced each year early in the spring from the supervisor's office, and complete suggestions for the construction of the yachts were prepared. Rules defining the sizes of the yachts, the registration of entries, and the judging of the models were issued. It was provided that all of the work be done outside school hours, and that there was to be no interference with regular school work. Mr. Charles Miller, assistant supervisor, acted as consultant, and assisted in gathering drawings, reference books, etc. He also answered questions and acted as general advisor for the contest.

In 1923, the contest concluded on June 23rd, on which day the model yachts entered were judged for workmanship, finish, and performance. In all, fourteen contests were held, as follows:

1. The Herald Cup Race. (Model not exceeding 30" in length and sail not to exceed 770 square inches.)
2. The Best Construction. (Including modelling, finishing, and rigging.)
3-7. Best model of Mayflower, Viking Ship, Battleship, River Ferry Boat and Submarine. (Must submerge and rise automatically.)



THE WINNER AND THE JUDGES



SKETCH OF THE 36" BOAT SUGGESTED AS ACCEPTABLE FOR THE CONTEST.

Prizes and certificates of merit were awarded in each of the fourteen contests.

In 1924, three silver trophies were offered by the Herald, and certificates of award were offered for the smaller craft contests. The contest for 1925 has not yet been completed.

The accompanying illustration shows the type of boat which was recommended for the 36" model. It is based on one of the models in Cavileer's Model Yacht Building. Figures 1 to 5 illustrate suggestions for cutting the hull and for mounting the tiller. Figure 6 is a bench stop which proved to be particularly helpful in chiseling and gouging.

PROTESTS RUBBER BIRD HOUSES

To the Editor:

Why, oh why, do you publish such impractical things as the bird house by Mr. W. W. White, of Waterloo, Iowa? It is made of an old tire.

Just think of the deception one plays. In the spring time when everything is cool and nice, a poor, little, unsophisticated wren builds her nest in this "up-to-date" apartment. Then about the time the eggs are hatched, along comes the sun in all its fury, and what is the result? Just try wearing a pair of rubber boots and a rubber raincoat on a hot July day.

Birds want wooden houses, unpainted, an old hollow branch, or a tree trunk.

And then, horrors, suppose the birds become accustomed to these houses and begin pecking holes in tires of machines parked along country roads or in the farm yards!

I think Mr. White is working for the rubber industry.

Respectfully yours,

W. BEN HUNT.

Hales Corners, Wis., March 26th, 1925.

IN SUPPORT OF INDUSTRIAL ARTS

To the Editors:

I wish to congratulate you on your brief editorial entitled "Why Condemn Industrial Arts Work?"

This is a subject that will bear more comment and should not be allowed to be smothered by strictly vocational enthusiasm.

Every convention or section meeting which the writer of this letter has attended in recent years, in which shop teachers were assembled, has been woefully one-sided. The vocational idea has been put so much to the fore that the greater number of teachers present might be made to feel that "manual arts" no longer had a place in the curriculum.

I hope to read more in your magazine about this subject.

J. F. DENNIS.

Kingston, Pa., March 29th, 1925.

VOCATIONAL EDUCATION SOCIETY OF BOSTON

The Vocational Education Society of Boston held its regular monthly meeting and luncheon March 14th, in the lunch room of the new Quincy high school building. The removal of the meeting from Boston proved an attraction rather than a handicap, judging from the attendance, which reached one of the largest figures of the year. Assistant Superintendent Woods of the Quincy city schools made an admirable host, and was given an enthusiastic vote of thanks. Director E. P. Barrows of the Quincy vocational school, and his staff of instructors, have long been among the most interested and valuable members of the Society; and their fellow members appreciated the privilege of meeting with them on their home territory.

The speaker of the day was Mr. Dennis A. Dooley, agent for class organization, Division of University Extension, Massachusetts Department of Education. Mr. Dooley's voice is not unfamiliar to radio audiences, and he has done notable pioneer work in the state's newest form of educational effort.

The speaker pointed out the fact that, since Massachusets has no state university, the extension program is the only form of education for the people in general which is carried on directly by the state. The Agricultural College, the normal schools, the Nautical School and the textile schools are all limited to the fulfilment of specialized aims.

The Division carries on two types of work: in classes, and by correspondence, respectively. In the past year, from twenty-five to thirty thousand pupils were enrolled, more than half of whom were organized in classes.

At the conclusion of Mr. Dooley's interesting talk, Principal Collins of the high school conducted the party through the new building, which is a fine specimen of modern school architecture. The vocational school is housed in an annex to the high school building, and its staff was on hand to show the guests its fine quarters and equipment. In addition to the original departments in which the Quincy school was one of the pioneers, it has recently established an automobile repair department.

The next meeting of the Society will be held April 11th, the place and the speaker to be announced later.—Frederick Ames Coates.

NEW YORK SCHOOL CRAFTS CLUB

The School Crafts Club met for its regular March meeting on Saturday evening, March 28th. Two very inspiring speakers were heard before the round table discussions took place.

Mr. Edward Reuther, assistant commissioner of education in New Jersey, spoke on "The Shop Teacher's Mission." Mr. Reuther referred to the subject of Industrial Arts as being the salt of the curriculum, since it represented its liveliest factor. He feels that this activity is largely responsible for the marked increase in those going on to high school today.

In order that industrial arts may continue to grow it is necessary that the public be kept aware of the part it is playing. Many large city evening papers are giving a whole page to news regarding the activities and news of the schools. This is worth while propaganda. Every opportunity should be seized to get the industrial arts before the public. This advertising is entirely permissible, provided the names of teachers themselves are to a great extent left out of the write-ups.

Shop teachers have a great opportunity to size up the mental capacity of boys, for it is possible to tell how the mind works by watching the hands. In studying the actions of boys one is able to tell how rapidly the mind works.

We must constantly be studying the problem of shop-work in order to prevent damage to equipment and tools through thoughtless handling of them. More tools are made useless through abuse than by wear. The teacher must attempt to forestall this by properly educating the boys as to their use. Chisels with wooden handles should not be hit with steel hammers, but by wooden mallets in order to prevent split handles. It takes a good deal of study to get the desired reactions from pupils. Wherever parts move together friction takes place and lubrication is required. This applies to bench vise screws as well as machinery. Vise handles should not be hammered.

Boys get a good deal from the influence of a strong man in the shop. If the teacher shows ingenuity, it is catching. The teacher then must be on the alert to hold industrial arts in the curriculum, to study boys, and to get reactions.

Mr. K. L. Zimmermann, publicity director for Henry Disston & Sons, introduced to the School Crafts Club Mr. John Arnold, who is the superintendent of the Disston plant in Philadelphia. Mr. Arnold represents the third generation of his family working with Disston. He bore out Mr. Reuther's statement in regard to abuse of tools, in that most saws returned for correction are injured by abuse, not use. One source of abuse is from using only the middle of the blade, in taking eight-inch to ten-inch strokes with a saw nearly three times that length. This causes the teeth in the middle to dull first. The mistake applied to filing is to sharpen only the dulled teeth, so that in course of time the saw becomes bow-shaped—no longer straight.

A saw, when properly set, cuts a kerf only twice the thickness of the saw. It is wasteful to set a saw wider than this. One cause of teeth cracking out is that the set is applied too low on the blade, rather than confined properly to the teeth.

Buckling of saws is caused when a saw is set and filed too much on one side. When the saw binds in heavy wood the steel fiber of the blade is stretched. It takes an expert to straighten such a saw again. Hammering the saw makes it even worse.

Jointing a saw before setting is important in that the teeth are levelled to one height and the blade is kept straight.

In filing, the file must point towards the saw handle, in order to keep the flash (wire edge from filing) on the back of the teeth rather than on the cutting edge. The file should be kept well down to the bottom of the teeth in order to preserve the proper shape and rake.

Warn boys not to saw wood part of the way and then split it the rest of the way by jamming the saw. This tends to buckle the saw. The proper order for resharpening a saw is: (1) Jointing; (2) setting; (3) filing.

The men then split up into three groups to hear the following discussions: Mr. Henry D. Burghardt of Dickinson High School, Jersey City, N. J., spoke upon "Of What Use Is the Machine Shop in the High School?" Mr. John Arnold answered questions on saw filing and care. Mr. R. F. Hemion, of Patterson, N. J., spoke on "Veneers Used in Woodwork."

Mr. Burghardt feels that more up-to-date methods are necessary in teaching machine shop practice generally. Time is not available to teach a trade thoroughly as in the apprentice-contract days. He told of a friend who showed him his apprenticeship papers in which he had signed up to serve an apprenticeship of 12,000 hours; or ten hours per day, 300 days per year, for four years—not just **four years,** as at present. Boys may be trained in the use of a given machine today by following jig methods. It is true this does not turn out all-around machinists.

In the machine course at Dickinson High School a boy has 80 hours in 9B, 150 hours in 10B, and 150 hours in 11A. Contrast 380 hours with 12,000 hours. What benefit does a boy get from this? Only an idea of the different processes, materials, and machines. He learns the fundamental principles, some degree of accuracy, and an appreciation of the different tasks involved.

Mr. Burghardt has worked out a scheme with his assistant which doubles the efficiency of teaching. The school is on a one session plan. Twice a week the boys come back from 12:30 to 2:30 for extra periods. One hour is given to study and one hour to recitation. Written lessons are used to get around the class every day, something which oral quizzing does not do efficiently in teaching related work to machine shop practice. Mr. Burghardt has found this practice much better than collecting the boys together in the shop among the machines and lecturing. In the latter method a large proportion will not pay attention—day dream, etc. By making each pupil study and be responsible for written answers he has been able to get more over to the pupil. They study the construction and operation of machines; and questions are planned to bring forth a short answer, in order to make the correcting of papers as light a task as possible.

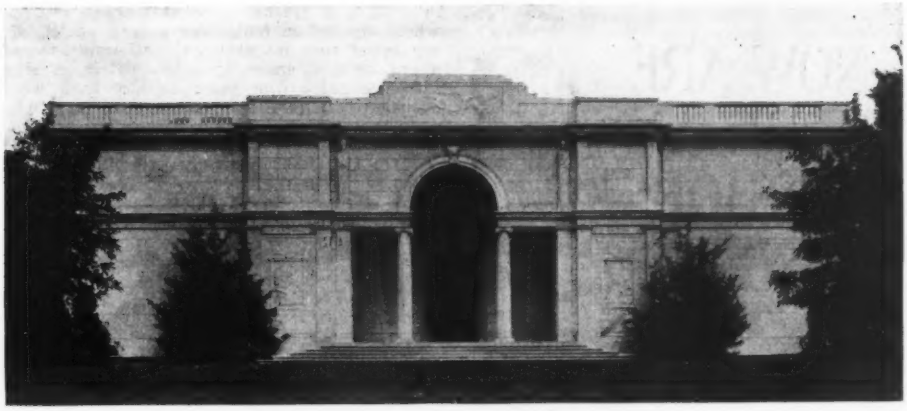
Mr. R. F. Hemion led a very interesting discussion on veneer. He described the various methods of making veneer, including the parallel saw cut and the rotary knife cut. Samples were exhibited in walnut, quartered oak, and whitewood. Mr. Hemion described the process for applying veneer to flat and curved work and exhibited jigs and clamps used to hold the work while drying. All veneer work should have a binding strip running at right angles to the outer veneer, between it and the core. The binding strip is a veneer made from less expensive wood.

Some people have an idea that veneer furniture is all cheap, but in reality when veneering is properly done it is expensive to do and produces very lasting furniture. Both sides of wood should be veneered to prevent buckling, this makes then five layers of wood.

The Annual Banquet of the School Crafts Club is to be held May 2nd. Some fine speakers are promised on the program.—**Lloyd F. Stair.**

A PRACTICAL USE FOR CARTOONING.

Used to illustrate a full page on night school work in the Daily News, Miami, Florida. Drawn in the cartoon class in the night schools, Miami, Florida.



BROOKS MEMORIAL MUSEUM, MEMPHIS, TENN.

THE WESTERN ARTS CONVENTION PROGRAM

The Western Arts Association will hold its thirty-first annual convention May 5th, 6th, 7th and 8th, at Memphis, Tenn. This will be the first Dixie meeting of the association, and from present indications, it will offer a program of splendid interest and profit to the members in attendance. Memphis, with a population of 227,000, with its 32 hotels, and its accessibility by ten trunk line railroads, offers exceptional advantages as a convention city.

The headquarters for the convention will be at the Claridge Hotel, while the general sessions will take place in the new two-million-dollar Municipal Auditorium. The educational and commercial exhibits will be shown in the arena of the north hall, while the meetings will take place in the adjacent south hall of the same building.

The general subject for the meeting will be "Art and Industry" or "Art in Business." At the general session on Wednesday, May 6th, the subject of "Art and Industry" will be handled by Prof. Franz Aust, University of Wisconsin, who will give a talk on Democratization of Art. Other papers at this session will be one on Federated Council on Art Education, by Miss Mary C. Scovel, Art Institute, Chicago; What Next in Art Education? by Miss Bess E. Foster, of Oklahoma City, Okla.; Art in Small Communities, by Valentine Kirby, state director of art for Pennsylvania.

The principal speaker at the convention will be Prof. Henry Turner Bailey, who will speak at the general session on the subject of "The Realm of the Magic Arts"; at the round-tables on "Candle-Light on the Designer's Problems," and "Printing as a Fine Art," and at the banquet on "Self-Activity for Art Teachers."

The round-table meeting, which is expected to be most profitable and interesting, has been worked out on a combination plan, taking as its main subject, "Developing Interest and Appreciation in Art." This section resolves itself into four divisions: (1) A Museum Experiment — Demonstration with Children, Miss Anna Horton, Cleveland Museum of Art; (2) Teaching Appreciation through Music, Miss Florence Fitch, director of art, Indianapolis, Ind.; (3) Art Projects for Stimulating Scholarships, Mrs. Winifred Mills, Fairmount Junior High School, Cleveland, Ohio; (4) Art Weeks and Their Objectives, Miss Mary Robinson, supervisor of art, Washington, Ind. At the joint meeting with the manual training section. Mr. Henry Turner Bailey will speak on "Candle-Light on the Designer's Problem." Miss Floy K. Hanson, of Memphis, will talk on the subject of Textiles before the Art and Home Economics Round-Table. Other well-known authorities who will give talks are Mr. Ellsworth Woodward, director of the Art School of Sophie Newcomb College, New Orleans, La., and Mr. Otto Zahn, bookbinder of Memphis.

There will be the usual reunion luncheons and visits to the various industries and places of interest in the city. This part of the program is in charge of the local committee on arrangements, of which Miss Mary V. Moore is the chairman, and an interesting and profitable program has been assured.

Additional information concerning the meeting may be obtained from Miss Mary C. Scovel, Art Institute, Chicago, Ill., vice-president; or from Mr. Raymond T. Fell, Dayton and Baymiller Streets, Cincinnati, Ohio, secretary.

PITTSBURGH INDUSTRIAL ARTS MEETING

The Pittsburgh Industrial Arts Association held its regular monthly meeting on Thursday evening, March 27th, in Pittsburgh. Mr. Wm. Finlay, vice-president of the association, was master of ceremonies, announcing the various numbers on the program.

All talent taking part in the program were teachers of the industrial department of the city. The program consisted of vocal and instrumental solos, and a sketch by the faculty members of the Allegheny Vocational School. The evening was largely given over to amusement and sociability. Directors, supervisors, principals and members of the teaching staff spent a real get-together evening.

The April meeting of the association will be held on Saturday morning, April 25th, in the Schenley High School.—**J. W. Heatley.**

TWO-MILLION-DOLLAR AUDITORIUM AT MEMPHIS, TENN. SEATS 12,500 AND HAS AN EXHIBIT SPACE FOR 210 BOOTHS. IT WILL HOUSE THE WESTERN ARTS CONVENTION.

NOW, ARE THERE ANY QUESTIONS?

Finishing a Canvas Canoe

Q. 488. Please tell me how to refinish a canvas covered canoe, also how to finish a newly covered one.—K. C. D.

A. Since no color is mentioned in your inquiry it is assumed that it will be white. The old canoe should have its varnish removed thoroughly with paint and varnish remover down to the canvas, using a steel scratch brush should the occasion demand. Complete the washing of the canvas with denatured alcohol and a scrubbing brush to effectually remove all traces of the paint remover. From three to five days' drying should then be allowed in order that the canvas may be thoroughly dried.

A lead and zinc paint carrying at least 25 per cent zinc, or better still, a titanium oxide paint, such as Rayolite made by the Hazard Lead Works of Hazardsville, Conn., should be used as a priming coat. It should contain a medium amount of oil and little or no turps in order to give maximum covering capacity and yet retain some flexibility. In the case of the Rayolite, I have found that this material has from three to five times the covering capacity of either lead or zinc even though used at the rate of six to seven gallons of raw oil per five gallons of paste Rayolite.

Any number of coats may be applied and in case the work is done in a warm room about five days' time should lapse between coats, more if done in a shed or barn.

In order to produce a smooth surface it will probably be necessary to sand, for which purpose Minnesota Mining Company's Wet or Dry No. 2-0 will probably be best for wet sanding.

As a final coat to a high grade job I like to use a coat of Pratt & Lambert's Vitrolite Enamel, since this material has very remarkable durability under exposed conditions of this type. The woodwork such as seats, etc., may be stained, filled if mahogany or birch are used, and given a number of coats of an outside spar varnish which has been selected for this class of work. A high grade floor varnish will, however, be found quite satisfactory, but the oil spar varnish is to be preferred.

In case a green color is desired such as is used on Old Town canoes, the white lead priming should be used followed by a color coat made by mixing paste colors in oil of the desired shade with a liquid half turpentine and varnish. This should be applied with a soft fitch or bear hair brush of the varnish type, allowing sufficient time between coats for each to become hard and tough. It will probably be necessary to apply at least three coats of this ground color since it will be found best to handle it in a very thin condition, at no time attempting to produce a paint like body. When the color is satisfactory, apply several coats of high grade spar varnish, preferably allowing not less than a week between coats. If it has been found necessary to sand for an even surface, this should be done on the coat next preceding the last color coats, in order that the latter may restore the full color tone and between the first and second coats of varnish. The last coat should be left in the full gloss as this is tougher and harder than the rubbed or sanded surface would be.—R. G. Waring.

Turpentine and Linseed Oil

Q. 502. Can you tell me which will dry more easily, turpentine or linseed oil, and why? I have two books on finishing and the two conflict with each other on this point.—H. E. E.

A: Turpentine dries almost entirely by evaporation, and a strictly pure type leaves no greasy trace on white paper. There is considerable dispute as to the chemical action which takes place when turpentine is used in connection with linseed oil. My own technical observations lead me to believe that turpentine does not, of itself, absorb oxygen during the process incurred through the hardening of a paint film. It does, however, become "bodied," or thickened when blown with warm air, or when exposed in bulk over a long period of time. It is my belief that its principal action is that of a catalytic agent, or middleman, by means of which oxygen is drawn into the paint film more rapidly than would otherwise occur. It is for this reason that turpentine driers are superior to union japans, since the latter are generally thinned with kerosene or light oil distillate.

On the other hand, linseed oil, with or without the addition of metallic driers—as cobalt, manganese, linoleates or resineates—changes from a liquid to a solid substance, in which case it is no longer an oil, but a definite chemical substance known as linoxyn. The metallic driers mentioned above remain in the film unchanged, and in no way whatever chemically affect or are affected by the linseed oil. They do, however, exert that wonderful process known as catalysis, whereby that drier secures oxygen in the pure form from the air in such a manner as to cause the film to change from the liquid to the solid state. So long as the process is incomplete, the film remains flexible and is not greatly affected by expansion and contraction. When, however, the process is finished, an inflexible condition results and the film begins the process of disintegration.—Ralph G. Waring.

Retaining Bark

Q. 516. What kind of trees best hold their bark on the branches after they have been dried and worked into novelty projects? Must the trees be cut at any particular time of the year?—P. S.

A: Trees which have close-grained woods seem to hold their bark better than trees which have coarse-grained woods. There is no official or scientific information available in the Forest Products Laboratory or elsewhere.

The U. S. Department of Agriculture recommends that trees should be cut in the late fall, October or November, and every effort should be made to spray them in the following spring against insects which infest the bark. This is especially recommended where it is desired to retain the bark permanently on the wood.

Splints and Willow

Q. 517. At what time of the year must ash saplings be cut to produce splints? What is the best way to remove the bark from willow sprouts one year old?—P. I. S.

A: According to Mr. Arthur Koehler, specialist in wood technology for the U. S. Forest Products Laboratory, Madison, Wisconsin, the time of the year for cutting ash saplings to produce splints is unimportant. Very few schools cut splints. Most teachers seem to prefer to purchase them.

Willow is cut in the fall of the year, just about the time the sap ceases to run. This is usually in October in the northern part of the United States. In some sections of the country the willow is cut in the spring, in March, but this is considered objectionable because it injures the stumps.

Cultivated willow is also cut late in the fall. The first year rods are not considered of much value. The second year rods are far better.

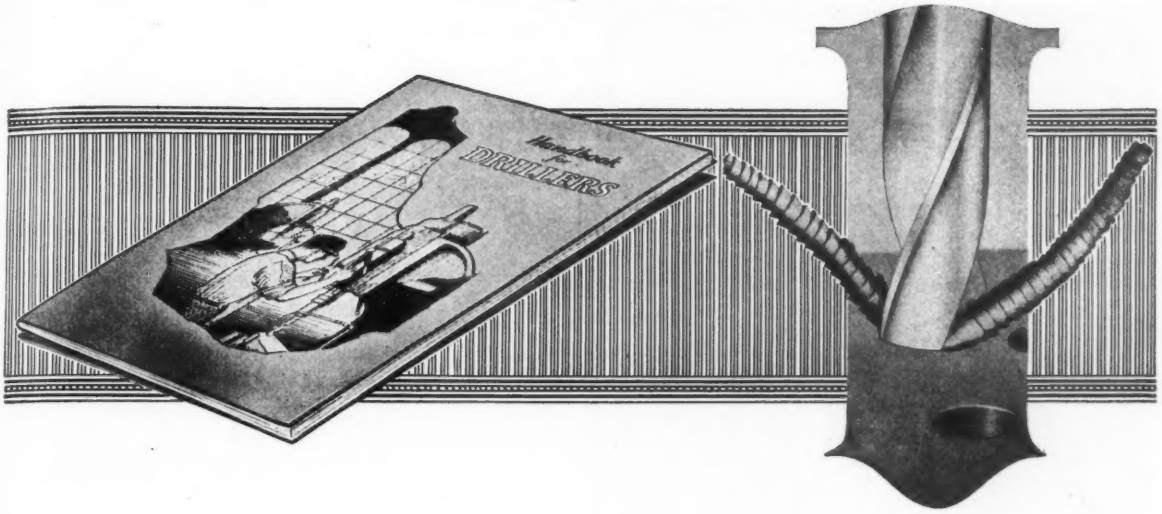
Willow is prepared for peeling by tying the rods in bundles and standing them on end in a shallow water container. After two or three weeks the submerged ends become a mass of rootlets and the rods are covered with short tender foliage. They are now peeled with a tool known as a brake, which can be made at any school or can be purchased.

A complete description of willow peeling will be found on page 129-30 in "Industrial Work for the Middle Grades," by Edward F. Worst (Bruce, Milwaukee).

Refinishing Table Tops

Q. 519. Will you please give me some information on the treatment of table tops, dull through use?—F. W.

A: Replying to your question as to treating table tops, dull through use, the best method, of course, is to strip the old finish with varnish remover and build up with successive coats to a proper finish. The so-called scratch fixing liquids are snares and delusions, and in my experience have been practically worthless. It may be possible to take these tops in their present condition and give them a thorough rubbing with FF pumice stone, felt pad, and water, thereby restoring them to a fairly good surface. If they do not clean up well with a good polish, then the only recourse is to remove the old finish and start again. In the majority of cases, this is most satisfactory. To expect good results by any other method is to attempt to build a house with only a few corner posts in place of a good, firm foundation.—Ralph G. Waring.



Use this Booklet as a Text

CHAPTER I

The Parts of a Twist Drill

This chapter as its head indicates is devoted entirely to the parts of a twist drill—namely, the "Point", "Heel", "Lips", "Body", "Web", and "Shank".

CHAPTER II

Points on Grinding

"Lip Clearance"—Its How and Why—Angle of Lip Clearance—Results of Faulty Angle of Lip Clearance—The Lips and Their Requirements—Result of Faulty Lip Angles.

CHAPTER III

Drill Speeds and Feeds

Starting Speeds and Feeds—Speed and Feed for High Speed Drill—Indication of Too Much Speed—General Recommendations.

CHAPTER IV

Miscellaneous Helps

Drilling Hard Material—Small Hole Drilling—Cutting Compound for Various Metals—Drilling with Automatic Machines Under Flood of Lubricant—Rough Hold—Thinning the Point.

CHAPTER V

Common Errors and Their Results

Broken Tangs—How to "Drift Out"—Handy Aids for the Driller—Table of Cutting Speeds.

IT is full of practical information and instruction on the use of twist drills. A copy placed in the hands of every student in machine shop practice as his first assignment in drilling, is a most effective method of laying the foundation for practical instruction in the use of this important tool.

The information, illustrations and instruction contained in this booklet are based on our knowledge and experience in the manufacture and use of twist drills for 50 years.

It is written in a non-technical style, especially adapted for class and shop instructional purposes, and is now used as a textbook on drilling in high Schools, Vocational Schools, Technical Schools, Colleges, and by manufacturing establishments maintaining apprentice schools.

A copy will be sent to supervisors and instructors of Industrial and Vocational Education on Request.

For Use as a Textbook. Copies of this booklet will be sent instructors, free of charge, in any reasonable quantities for use as a text by the students in machine shop practice.

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Carbon and High Speed Drills for every purpose; "Mezzo" Super-Carbon Drills; Hand, Jobbers' and Shell Reamers; "Peerless" High Speed Reamers; "Paradox" Adjustable Reamers; "Quick-Set" Reamers; Chucking Reamers for Turret Lathes; Counterbores; Countersinks; Sockets; End Mills; and the "Ezy-Out" Screw Extractor.

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Steel Tapes - Standard for Accuracy
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NEW BOOKS

Applied Print Shop Mathematics

By C. W. Hague. Paper, 32 pages. Published by the Bruce Publishing Co., Milwaukee, Wisconsin.

The principles of arithmetic applied to practical problems of the print shop. The text will be found useful in vocational as well as general high school classes.

Wood Finishing

By Harry R. Jeffrey. Cloth, 177 pages. Price, $1.50. Illustrated. The Manual Arts Press, Peoria, Ill.

This book has been prepared in response to a very widely expressed need for an elementary book adapted particularly to school use. The author has limited himself to the practical problems of finishing the widely used cabinet woods by staining, filling, varnishing, and polishing, and by the less frequently used wax-polishing, oil-polishing, and French-polishing methods. Added chapters take up enameling, stenciling, refinishing, old furniture, finishing floors, treating turned work, and typical treatment of specific kinds of woods. The discussions throughout avoid technicalities; the directions are brief and take into account that teachers and students are amateurs. The book is well illustrated.

Junior Mathematics

Book I. Ernst R. Breslich. Cloth, 12 mo., 280 pages. The Macmillan Co., New York.

This book offers a complete mathematical course for the first year of the junior high school. It forms a sort of bridge course intended to carry the pupil forward from simple principles and operations of arithmetic to the more difficult principles and methods of algebra and geometry; from problems of child interest and immediate value to problems of interest and value in adolescence and adult life; from the acquiring of fundamental number processes to the realizing of quantitative relations and the making of mathematical habit of thought effective and permanent. The use of line segments, formulas, angles, the circle, simple geometric constructions, and equations make up the body of the book. Arithmetical operations are reviewed. The problems are of the life interest type. New matter is approached inductively.

Drawing for Zinc Etching

By Ray Matasek. Cloth octavo, 64 pages, illustrated. Price, $1.35. The Bruce Publishing Co., Milwaukee.

Beginners in art rarely understand the possibilities and limitations of the several engraving processes, and have difficulty in adjusting their drawings to the needs of the photo engraver. The present book is intended to suggest methods and techniques which will be found useful in preparing drawings for reproduction by what is known commercially as the zinc etching process. The book is primarily intended for school use, and is the result of the author's experience in teaching classes of boys and girls. The work is specific and amply inclusive for high schools, continuation schools, and even vocational art schools. It suggests definite uses of crayons, pen and ink techniques, stipple work, silver print drawing, spatter work, brush drawing, paper batik drawing for the Ben Day process, and drawing for line color plates. Every type of work is fully illustrated. The introductory chapter discusses the zinc etching process so that the artist may have an understanding of what the engraver does. The book will be found particularly useful in high school classes, and will be excellent for reference use by teachers and groups who are preparing work for publication in school periodicals and annuals.

Job Instruction Sheets on Practical Electricity

By Walter B. Weber. 29 job sheets in loose leaf paper cover, size 8"x10½". Price, $1. John Wiley & Sons, New York City, N. Y.

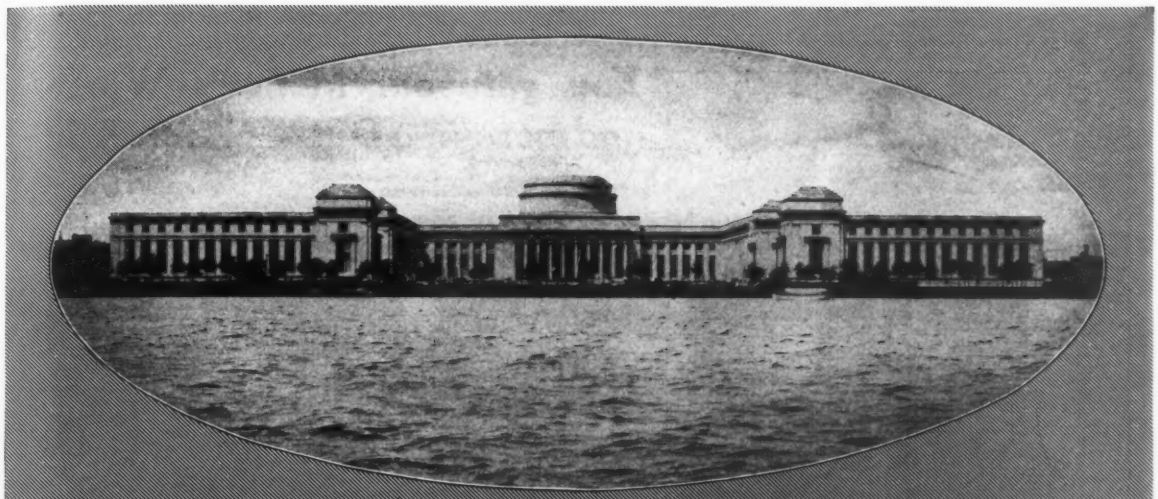
The course is elementary and general covering briefly bell and light wiring with several optional sheets for exceptional students. The latest code requirements on the problems presented are lacking. The job sheets are not designed to displace the teacher and considerable related reading is expected of both teacher and pupil in order to reach the desired objectives.

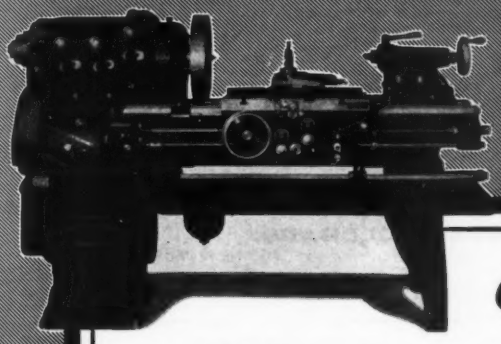
Each job sheet includes the following divisions: object of the lesson, material and tools required, operations to be performed, questions to be answered, and helpful information.—B. B.

Shop Problems on Tracing Paper—Toys

Sixteen tracings in folder. Price, $0.35. The Manual Arts Press, Peoria, Ill.

This series of problems includes 26 toys, each suitable for reproduction in elementary shops.





and now—

The Massachusetts Institute of Technology uses The

MONARCH Helical Geared Ball Bearing LATHE

as a part of their Metal Working Equipment.

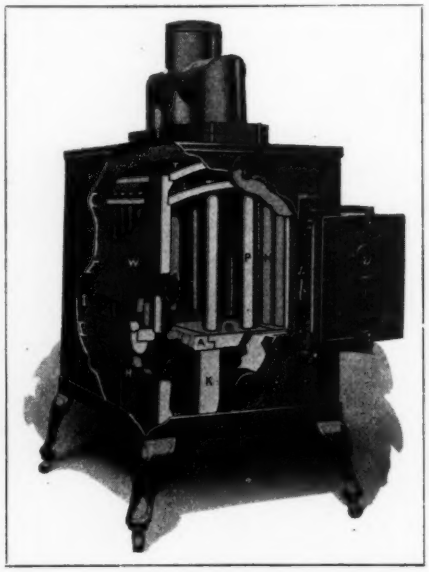
The prestige of this Institute—the corner-stone of Massachusetts' enviable system of vocational education — attracts students from the four corners of the civilized world.

In choosing the equipment for these students, the directors of the Institute must base their choice upon equipment that will give students the greatest possible amount of experience.

We are proud of the selection of the MONARCH Engine Lathe as a part of the Institution's metal working equipment — proud that it has been selected solely upon its merit, after careful consideration, as the type of equipment necessary for the high degree of training which Massachusetts "Tech" gives to its students—a training which has been so creditably reflected on the Institution by its graduates.

We shall be glad to plan your vocational metal working shop. Give us a statement of your requirements and let our Free Engineering Advisory Service plan your shop, giving you an accurate estimate of the entire equipment cost. This service is gladly rendered without charge.

THE MONARCH MACHINE TOOL COMPANY, 404 OAK STREET, SIDNEY, OHIO.



You get your Money's Worth *and more, in a* DFC Keramic Kiln

You get your money's worth out of a DFC Kiln because it helps you speed up your work without injurious effects; embodies the latest improvements, has a lining that will last twice as long as the ordinary, and costs you far less to operate.

Then, too, you have no "T" Tubes and elbows inside the muffle. These have been replaced by a unique arch top that takes the weight off the tubes, thereby, increasing their life and making it very easy to replace tubes when necessary. This is the greatest improvement that has been made in muffle kiln construction in years. The entire circumference of tubes exposed to inside of muffle, assures a rapid and uniform heat, and the tubes are free to expand and contract without interference.

DFC KERAMIC KILNS have always been noted for their exceptionally high grade fire clay lining, but we have now developed a NEW SUPER-REFRACTORY LINING which is far superior to the best fire clay lining made heretofore. It will last twice as long, and it will pay you to look into this one feature carefully before you buy your next kiln, because,

"AFTER ALL, THE LINING IS THE KILN!"

You can buy from:

Lewis Institute, Chicago.
L. Reusche & Co., New York.
Chapman-Bailey, Los Angeles.
Cooley's Incorporated, Boston.
Thayer & Chandler, Chicago.

THE DENVER FIRE CLAY COMPANY

DENVER, COLORADO.

SALT LAKE CITY EL PASO NEW YORK CITY

NEWS AND NOTES FROM THE FIELD

Commission to Study Industrial Art. In the direction of furthering the development of art in industry, Secretary Herbert Hoover, of the U. S. Chamber of Commerce, has appointed a special commission which is to visit the International Exposition of Modern Decorative and Industrial Arts, to be held in Paris, during the present year. The commission is to view the work on exhibit and report its findings to the Secretary for the benefit of American manufacturers. In this connection, also, it has been ordered that delegates from trades in which art is prominent be designated by their official bodies to visit the exposition. The commission and delegates expect to be present in Paris in June in time for the opening of the exhibition.

Vocational Commencement Exercises. The so-called best year in the vocational night school of Kokomo, Ind., came to a close on March 5th, with exercises in the high school auditorium. The enrollment record showed more than 600 class members against 553 for the previous term.

At the program, 35 pupils were given diplomas after completing a two-year course, and 525 pupils were given attendance certificates. Addresses emphasizing the value of the trade school work to the community, as well as the individual, were made by Elwood Haynes and Dr. J. R. Morgan. An added feature of the program was the expressions of appreciation from pupils to teachers. During the closing moments of the exercises, the millinery instructor was presented with a basket of roses from the members of her class, the dressmaking instructor was given a shower of gifts from her class, and at the close of school a spread was given for another teacher of sewing. The pupils graduated were from the classes in auto-mechanics, nursing, dressmaking, manual training, millinery, bookkeeping, real estate and title reading.

Build Summer Houses. The carpentry trade school, a unit of the vocational school at Joplin, Mo., recently completed two summer houses which were sold at public auction. The houses were built from good material, and were completely screened and painted.

Approve Extension of Work. The school board of Sunbury, Pa., has approved a bill before the state legislature, providing for an extension of the vocational work for the schools of Pennsylvania.

Open New Automobile School. The growth of the automobile mechanics school of the New Bedford, Mass., vocational school has made necessary the opening of a branch school in a rented structure formerly used as a garage. The new location will be used for first-year members of the class in Ford car mechanics. At the school automobiles are completely overhauled by the boys, valves are ground, engines overhauled, chassis defects remedied and other small jobs carried out under the direction of the instructors. All repairs are tested upon the road and in the shop before they are allowed to leave the shop.

The instructors in charge of the work are experienced automobile mechanics of demonstrated ability, and they are held responsible for the actual supervisory duties connected with the work.

Vocational Class. A class in the art of show card writing was recently opened at the Erie Boys' Club, Erie, Pa. Nearly 500 of the 800 members of the club now receive instruction in one of the vocational classes of the club. Among the subjects offered are show card writing, printing, electrical construction, woodworking, radio and wireless telegraphy.

Study Industrial Art. A step in the modernization of household furniture and interior decoration in American homes has been taken with the opening of a series of lectures on modern industrial art at the Chicago Art Institute. In this direction, the Institute has secured the services of Prof. Charles R. Richards, chairman of a commission to study ideas in design at the Paris Exhibition, to deliver a series of six lectures under the Scammon Foundation. The Institute is preparing to erect a school of industrial art to the east of the present building, which will be the third school of this character in the country. The school will give attention to the training of artists in the designing of furniture, floor and wall coverings, draperies and lighting fixtures, and to the development of new forms and motives adapted to modern life.

Oppose Limitation of Fund. Vocational school authorities in Texas have opposed a proposed amendment of the appropriation bill, limiting the amount that may be given to any district to $8,000. The vocational schools of El Paso, alone, would suffer a loss of $12,000 annually under the amendment.

Vocational School Delayed. The erection of the proposed vocational school at Beloit, Wis., has been delayed by the city plan commission, which has vetoed the site selected by the vocational board.

Reactions of Graduates to School. Mr. Carl T. Cotter, director of industrial education at Toledo, Ohio, speaking recently before the vocational section of the National Education Association at Cincinnati, gave the results of a questionnaire sent to graduates of the public schools. The findings revealed that the majority of the students preferred general industrial arts training to specific training; that language, other than English, might be eliminated or have less emphasis; that manual training has a vocational aspect, and that interest in self-education continues after graduation.

Propose Vocational School on Mare Island. Plans have been outlined for the establishment of a vocational school in one of the buildings of the Mare Island Navy Yard near Vallejo, Calif. The school would be housed in Building 208, which served as a school during the war and which is now partly occupied by the apprenticeship school and the nautical school. It is estimated fully one thousand pupils from all parts of California could be housed in the building, and it is possible much of the unused equipment of the government could be put to immediate and practical use.

Under the proposed plan, students will spend one-half time in practical work in the shops on a commercial basis, while the remainder of the time would be spent in class and recitation work. Following the completion of a four-year course, a regular high school diploma would be granted, giving to the holder advanced standing in his trade.

Short Unit Courses for Sheet-Metal Workers. The Smith-Hughes department of the Kansas State Teachers' College at Pittsburg, Kans., has issued an outline of a short unit course

(Concluded on Page 28a)

Education Through Wood Working

is founded on the experiences of hundreds of teachers of woodworking in schools of the United States, Canada and the Philippines.

Twenty-two prize winning essays comprise more than half of the book. The balance is devoted to up-to-date methods of modern practice in woodworking entailing the use of machinery.

No teacher of woodworking can afford to be without this book when it is considered that it will be furnished to them at cost.

Education Through Wood Working

contains 354 pages gilded at top, with 150 illustrations, numerous charts, drawings, stock bills, diagrams, etc. The book is 6½ x 9¾ inches in size and is bound in Levant pattern leather, with the lettering in pure gold.

In fact no expense has been spared to make the physical beauty of the book worthy of the unusual quality of its text contents.

Price to teachers and directors of woodworking $2.50.

Other Publications

Issued by us to teachers of woodworking are as follows:

On the Manufacture of a Teacher's Flat Top Desk.
Accompanied by a set of instruction sheets for class room study.

Chats on Period Styles in Furniture.
Issued in series and deals historically with Chippendale, Adam, Hepplewhite, Sheraton and Duncan Phiffe. Only the first three have been printed thus far.

These are free to teachers of woodworking, 25 cents each to all others.

"The Tools of School are the Tools of Life"

American Wood Working Machinery Co.

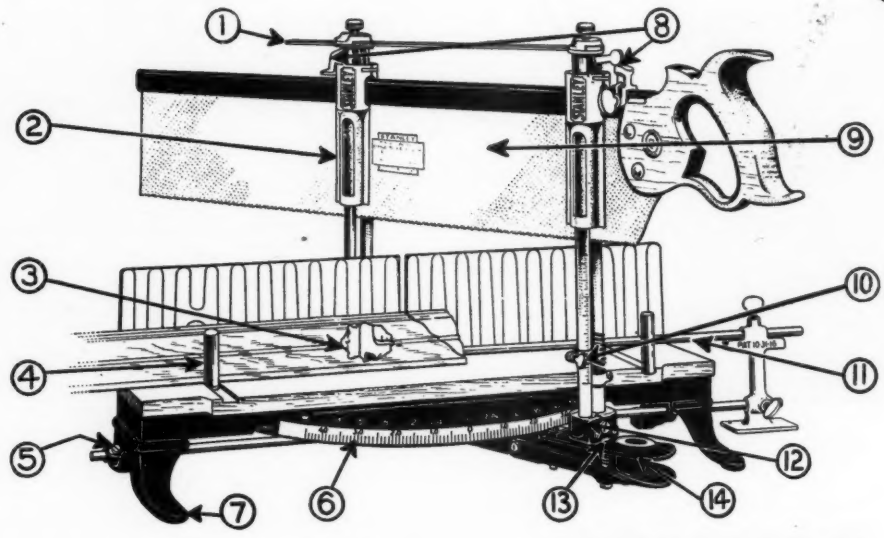
Educational Department

Rochester, N. Y.

American Motorized Finishing Planer

Stanley Mitre Box

STANLEY SW



Send for an explanation chart showing this Stanley Mitre Box No. 346 and its 14 outstanding features.

STANLEY
NEW BRITAIN, CONN., U.S.A.
THE STANLEY WORKS — THE STANLEY RULE & LEVEL PLANT

(Concluded from Page 26a)

intended for study by journeymen and apprentices. In all, eleven courses are offered, part covering six weeks' study and the remainder twelve weeks of study. With the aid of the work outlined, it is easily possible to keep evening classes large enough to be operative, a difficulty which has been encountered in the past.

Model Boat Work. A boat building contest will be held in May, at Crawford, New Jersey. The contest is conducted as a part of the work in the manual training shops of public schools in Union County. Among the prizes to be offered are the following:

Silver trophy from the Elizabeth Daily Journal, as a school award for the best collective result; set of Disston tools for the best individual result based on workmanship and design; seventh and eighth grade prizes, Stanley tool outfit No. 903 valued at $20; Stanley tool outfit No. 904 valued at $15; Stanley tool outfit No. 905, valued at $6.50; high school, Stanley tool outfit No. 903 valued at $20; Stanley tool outfit No. 904 valued at $15; Stanley tool outfit No. 905, valued at $6.50.

Under the rules governing the contest, each instructor and group of boys must be placed upon their honor as to the model they present. They pledge themselves not to get any instruction outside of the school or shop, and the actual work on the models must not be done by expert mechanics outside of the teaching staff.

Shop Improvements at Bluefield. The manual training department of the Beaver high school at Bluefield, W. Va., has undergone extensive improvements and changes this year. A broadening of the manual training activities has made necessary the employing of another instructor, Mr. A. W. Easley, in addition to the present instructor in woodwork and mechanical drawing.

Under the direction of Mr. H. A. Bailey, director of manual training, the woodwork department has been moved to an annex building, where three rooms now take the place of the former combination bench woodwork and machine woodwork room. All woodworking machines and wood-turning lathes have been removed from the bench woodwork room as a result of the added space provided.

A separate room has also been provided for lumber storage, for varnish and for the preservation of completed projects.

A glass-partitioned section in the bench woodwork room offers space for a small finishing room for projects. There is also provided a demonstration tier for use in demonstrations of classwork.

The mechanical drawing room has been completely equipped with modern drawing instruments, tables and locker equipment.

Exhibition of American Industrial Art. The trustees of the Metropolitan Museum of Art, New York City, have announced a private view of an exhibition of American industrial arts.

Better Manual Arts in Iowa. The Iowa Association of Industrial and Manual Arts Teachers has issued a small school paper, "Better Manual Arts," as a medium through which industrial and manual arts teachers of the state may express their ideas and thus improve the general standard of shop work. The paper offers opportunities for the promotion of a professional spirit, unification of objectives, creation of greater harmony, and the development of new ideas.

Mr. William R. Baker, president of the Iowa Association of Industrial and Manual Arts Teachers is editing "Better Manual Arts" with the assistance of a group of energetic manual arts men.

Iowa Manual Arts Conference. A large attendance of manual arts instructors was reported at the round-table sessions of the North Central Iowa Conference, held at Fort Dodge, March 19th to 20th. Mr. W. M. Phares, of Fort Dodge, and Mr. W. I. Naden, of Webster City, were named as delegates to the state meeting of the association to be held next fall, at Des Moines. Mr. Naden is chairman of the manual arts meeting to be held next year at Fort Dodge, in connection with the annual conference.

Technical Education and the Metal Trades Industries. A summary report of an investigation by the National Industrial Conference Board, New York. The survey is the fourth study made and the findings will be analyzed, compared and published by the board in a composite report.

Offer Complete Industrial Program. The Kalaheo School at Kaukai, Hawaii, has this year adopted a full industrial program covering vegetable gardening, pineapple culture, tree planting, elementary woodwork, light forging, cement construction, elementary electricity, and sheet metal construction. In the girls' classes, instruction is given in cooking and sewing.

In the woodwork classes, the boys have made toys, waste paper baskets, taborets, tables and model houses for the primary grades. Light forging and metal work include the building of athletic and playground apparatus of steel pipe, metal incinerators, together with the elements of welding and tempering. Cement construction includes the making of concrete flower pots, foundations for the playground apparatus, park benches and vases Tin can work covers the making of models of bridges, derricks, girders, cranes, trusses and windmills.

Change Name. An additional appropriation of $32,000 and a change in name would be granted the Kansas industrial and educational institute at Topeka, under a bill introduced in the Kansas senate by the ways and means committee. Under the bill, the name of the school would be changed to the Kansas Vocational College.

PERSONAL NEWS NOTES

Mr. Hugo B. Froehlich has become editor of "Everyday Art," published by the American Crayon Co., Sandusky, Ohio. Mr. Froehlich succeeds the late Bonnie E. Snow, who was editor of the publication since its appearance in December, 1922.

Elected President. Miss Dorothea De Schweinitz, of Philadelphia, Pa., was elected national president of the National Vocational Guidance Association at the annual meeting of the society held in Cincinnati. Other officers elected were: Vice-President, A. H. Edgerton, Madison, Wis.; Secretary, Miss Anne S. Davis, Chicago; Treasurer, Harold Bixler, Atlanta, Ga.

Mr. G. D Armstrong has been elected to the presidency of the Arkansas Polytechnic College at Russellville, Ark. Mr. Armstrong had previously been reelected as superintendent of schools at North Little Rock, Ark.

What William Found Out About Garden Sticks And "Prang" Tempera

William made some garden sticks in school and brought them home for father's new garden.

"Not so bad, not so bad!" said father, as he found them in place the next morning and gleefully pointed them out to mother.

"I think they're wonderful for a boy of fourteen," replied mother. "And best of all, William said Mr. Brownell only made a few corrections in some of the outlines, and suggested the paints he ought to use. Outside of that, it is all William's work."

"Can't tell me our kids don't learn anything practical in school these days," chuckled father. "Look at those colors and the way they brighten up my garden patch!"

"The colors used on these garden sticks are the new 'Prang' Tempera," said William coming up to join them. "Aren't they rich and brilliant, though? Mr. Brownell says there's nothing like them for this sort of thing, and by Jove he's right!"

The

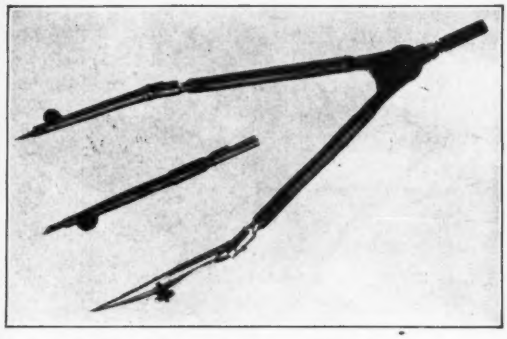
AMERICAN CRAYON COMPANY

ESTABLISHED 1835

SANDUSKY · OHIO · **NEW YORK** ·

"Old Faithful"

Manufacturers of "Waltham" and "Hygieia" Blackboard Chalk, "Prang Crayonex," the wax crayon pre-eminent, "Prang" School Water Colors, and Allied Products.



After 25 Years of Service

Only the Pen Points Need Resharpening

Resharpening the penpoints, a little polishing up and the instrument was as good as new. What a tribute to Weber-Riefler Instruments! And yet, this is but one of many similar instances. Never in the 25 year history of the Round System has an instrument or even a part been returned because of inaccuracy or defect. Could any instruments be more worthy of the draftsman's confidence than the Weber-Riefler Round System? Could there be more positive proof of the reliability of the friction joint? Ask to see a set the next time you pass your drawing supply house. Write for catalog of complete Weber line. Address Dept.: I. A.

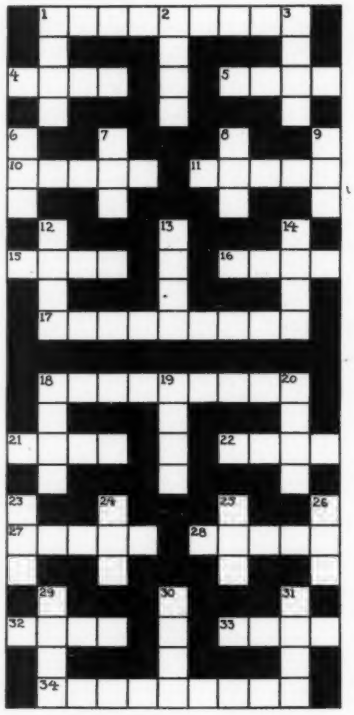
F. WEBER CO.,
1220 Buttonwood Street, Philadelphia
ST. LOUIS BALTIMORE

WEBER
Drawing Instruments & Materials
The Original Round System

A CROSS-WORD PUZZLE OF TECHNICAL TERMS

M. M. Walter, Director of Vocational Education, Bethlehem, Pa.

In a recent examination of the Machine Shop Practice Class at the Liberty High School, a cross-word puzzle of technical terms was used. The puzzle and the key are given below:



HORIZONTAL

1. A standard type milling machine.
4. Cutting tools.
5. The name of a gauge.
10. Where the current goes into the plating bath.
11. Alloy of copper and zinc and a little tin.
15. A strip cut with teeth so that a gear can mush.
16. Used to promote fusion of metals.
17. An arbor which can be made into various sizes.
18. A motor which runs by magnetic pull through the air without contact.
21. The thd. end of a spindle of the lathe.
22. A center for driving woodwork in a lathe.
27. A machine turning cylindrical work.
28. To form.
32. A standard type gear.
33. The advance made by one turn of a screw.
34. A die used as a standard.

VERTICAL

1. One.
2. Cutting lip.
3. Space between flutes or grooves in drills.
6. A hardened and tempered tool for cutting interthreads.
7. Calipers having both legs pointing in same direction.
8. A portion of a curved line.
9. A standard tap. (Abbrv.)
12. A measuring device.
13. Design.
14. To perform on a lathe.
18. A silver white metallic element.
19. The portion of a mold which shapes the interior of a hollow casting.
20. The rolling of depressions of various kinds into metal. (Abbrv.)
23. A unit of measure for length—mostly clothe.
24. The unit of electrical resistance.
25. Thread. (Abbrv.)
26. Length. (Abbrv.)
29. A mold made of a mixture of coarse sand.
30. Tools of hardened steel with sharp teeth across their surface.
31. A tool for measuring the depth of a hole.

Key to Cross-Word Puzzle on Technical Words.

Horizontal

1. universal
4. bits
5. ring
10. anode
11. brass
15. rack
16. flux
17. expansion
18. induction
21. nose
22. fork
27. lathe
28. shape
32. worm
33. lead
34. masterdie

Vertical

1. unit
2. edge
3. land
6. tap
7. odd
8. arc
9. U. S. S.
12. tape
13. plan
14. turn
18. iron
19 core
20. nurl
23. cell
24. ohm
25. thd.
26. len.
29. loam
30. file
31. gage

Farm Shop and Home Economics Work. A three-million-dollar rural aid appropriation has been made by the Texas legislature. A part of this fund is to be available for farm shop and home economics equipment.

Technical Instruction. The Texas Technological College at Lubnock, Tex., now has under construction buildings for home economics, engineering and textiles, estimated to cost $225,000.

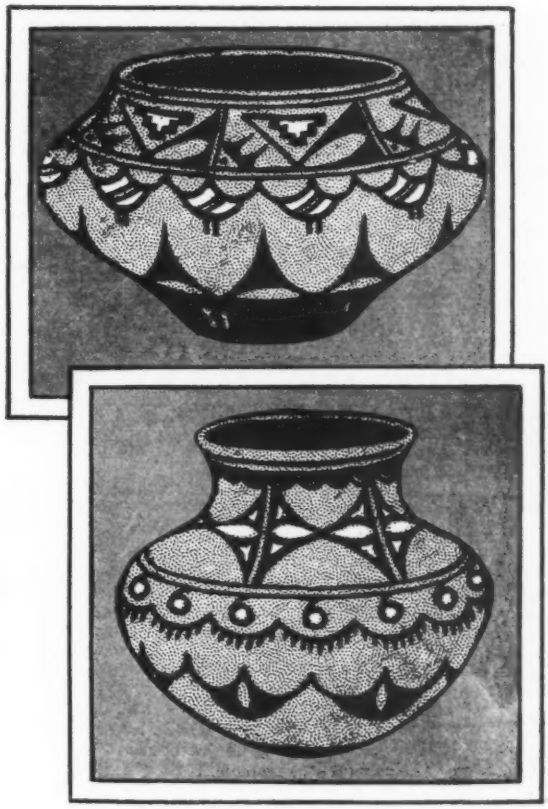
Texas Vocational Meeting. The Vocational Teachers' Association of North Texas met on February 28th, at Denton. The general program was followed by departmental meetings in industrial arts, commerce, agriculture and home economics.

Mr. J. M. Hall has resigned as state supervisor of industrial education in Texas, to accept a position as federal agent in trade and industrial education for the southern states. Mr. Hall is succeeded in his former position by Mr. N. S. Hunsdon.

The Romance of the Indian

Using unique designs of form and color, his strange history is caught in many symbols

PARTICULARLY in his pottery —where thoughts and deeds are held in vivid colors — is the romance of the Indian worked into his art. But how lifeless pottery would be without color!

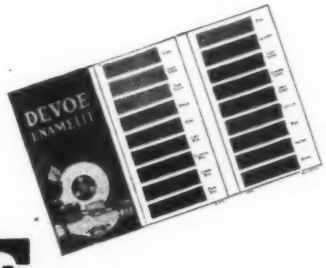


For color enlivens beyond description; and the students' clay-working need never want for color-variety.

When it's time to color their handiwork, give them Devoe Enamelit. Made in 22 striking shades, Enamelit faithfully reproduces the most intricate design. Applied with ease, Enamelit is air-drying and waterproof.

Devoe & Raynolds Co., Inc., 101 Fulton St., N. Y.

Devoe Enamelit works with entire satisfaction on pottery, woodenware, china, celluloid, earthenware, glass, oilcloth and papier mache. Send the coupon for color card showing samples of colors and directions for use.



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Makes Craftwork More Beautiful!

DEVOE & RAYNOLDS CO., Inc.,
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Please send me sample card of Devoe Enamelit.

Teacher's Name .....

School .....

Address .....

Bridge Arms

Antique Gold Finish
Wired Complete

WE carry a complete line of "Hard-to-Get" materials for the Shop. Cabinet hardware, electrical fixtures, K. D. cedar chests, solid copper chest trim, powder stains, finishing materials, upholstery supplies, Decalcomania transfers, etc.

Our Tenth Annual Catalog
Free for the Asking

THURSTON MANUAL TRAINING SUPPLY CO.

ANOKA, MINN.

BRIDGE ARM NO. 10½ B

BRIDGE ARM NO. 1 B

NEW TRADE PRODUCTS

High Production Swing Saw. The Oliver Machinery Co., of Grand Rapids, Mich., has recently brought out a new type of motor-arbor swing saw which is of interest to manual training and vocational instructors in school shops. The machine combines simplicity and efficiency, is made in one size and length, and is easy to swing and safe to operate.

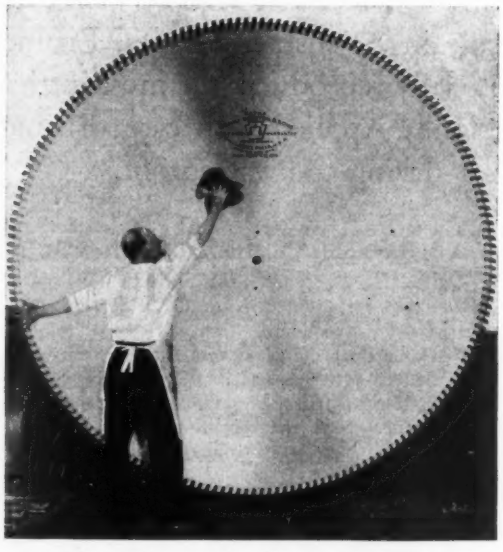
The hanger is cast in one piece, with 37-inch base machined parallel to trunion axis of the swinging arm. It is so designed that the machine may be mounted on either wall or ceiling as desired, with very little adjustment. The counter balance is constructed to give the operating arm an easy and lively motion. The slot in the weight arm is shaped to act as a safety feature by bringing the saw to its starting position. An adjustable weight arm offers two exclusive features; i. e., (a) a swing with the least possible effort for production, and (b) adjustment to throw arm back upon letting go of the handle, a safety feature of importance.

The stator of the motor is mounted in the housing. A shaftless motor, mounted and keyed to the saw arbor, has a load speed of 3,450 R. P. M. The motor is ventilated and is extremely efficient, dependable and safe.

The saw arbor is of crucible steel and is mounted in two radial ball bearings. The bearings are practically impervious to wear and are encased so completely that no dirt can come in contact with them. The machine is equipped with suitable guards for the operator, including an aluminum front guard and a motor and safety first switch guard.

The machine is especially recommended for school shops, where efficiency, safety and ease of operation are desirable requisites.

The Largest Saws in the World manufactured by Henry Disston & Sons of Philadelphia, Pa. The skill and resources of the Disston factory, with a background of 85 years of successful saw making, produced for the Weyerhaeuser Timber Company the largest circular saws in the world, measuring 110" in diameter, or 9'-2" from rim to rim. Each saw weighs 675 pounds and contains 190 teeth. The saws are of the spiral tooth type, a Disston invention. Each tooth is inserted in the blade on spiral lines, insuring smooth cutting and full clearance without setting the teeth. Steel of a special composition was required, and was made in the plant by Disston saw-steel experts.

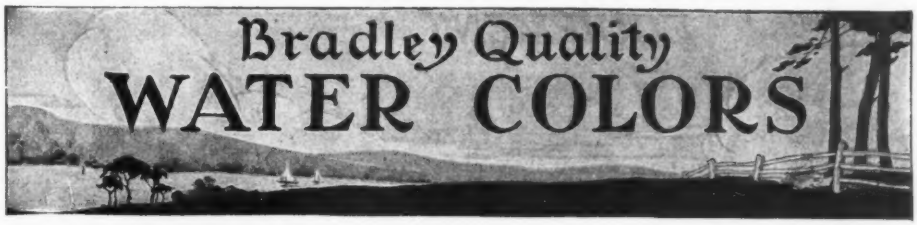


LARGEST CIRCULAR SAW IN THE WORLD.

Special Student's Table. Special methods of construction must be employed in building tables for the use of students, as they usually lean very heavily on their tables from all directions and unless the desk is properly constructed it will soon be of little use.

Accordingly the special student's table, as illustrated herewith, has particular merit, for incorporated in its construction are the latest methods and improvements,

(Concluded on Page 34a)



TONAL - TEMPERA

THESE Poster Colors are opaque, drying quickly with a dull, velvety surface that does not reflect the light. Lettering on posters or show cards can be read from any angle.

Tonal-Tempera is offered in 28 striking colors, including Black, White, Silver and Gold. They come in 2 oz. bottles.

The easy washing and remarkable covering qualities of Bradley's Tonal-Tempera Colors, have won the unqualified approval of art instructors.

TUBE COLORS

THE full range of Bradley's Water Colors are available in moist form in collapsible tubes — thirty-nine colors in all. For advanced art work, the tube colors are often preferred to the semi-moist pans.

These colors are all manufactured in our own laboratories, of the finest pigments. They are standardized to exact uniformity, and answer all requirements of water color painting. They will not harden in the tubes if capped after use.

BRADLEY'S FAMOUS SCHOOL ARTS BOXES

RANGING in price from 40 cents to $1.00, and containing from four to sixteen colors each, the Bradley Water Color Boxes are invaluable for school art instruction. The boxes themselves are heavily enameled, with mixing tray in the lid. The colors are semi-moist, in pans. One or two good brushes are included with each box.

Although put up in economical form, these boxed colors are of high quality. They will wash and blend perfectly. The colors are always uniform, in each box of a given number, so that an entire class may all secure the same results, though using different boxes.

WRITE to our nearest address for Catalog of material used in Art and Industrial Schools.

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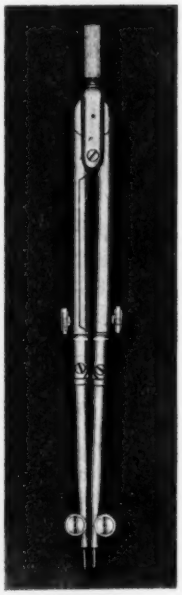
K & E DRAFTING ROOM EQUIPMENT



"MINUSA"
Drawing Instruments
High-grade American-made. All parts interchangeable and replaceable.

SOUND value at prices that have never spelled extravagance. You cannot afford to pay less than is consistent with satisfactory quality,—and QUALITY FOR QUALITY, OUR PRICES ARE LOWEST.

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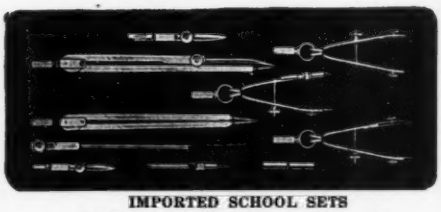
Drawing Materials, Mathematical and Surveying Instruments, Measuring Tapes

"POPULAR"
Drawing Table
A low-priced, serviceable table. Can be raised to 42" height and tilted to any desired slant.



IMPORTED SCHOOL SETS
Combine fair quality with very low price. Most of them with Straightening Device.

(Concluded from Page 32a)

which cannot be found in any other table on the market. Special features are: Iron pipe foot rest, metal shoes on the legs, construction of the drawing board with cleats on the ends to prevent warping and to furnish a suitable surface for the T square to slide upon.

THE NEW PEASE DRAWING TABLE.

This line of student's tables is manufactured in several combinations, tool drawers with locks in front and drawing board cupboards on the side. All of these tables are made in both adjustable and slide tops and are moderately priced.

One particularly popular type of table can be used in connection with storage cabinets where each student can deposit his tool drawer and lock it securely when not in use. The system of using the separate single drawers on the table is very useful where a large number of students are using the same table.

This special line of student's tables as well as a complete line of drafting room furniture is manufactured by The C. F. Pease Company, 802 North Franklin Street, Chicago, Ill.

Gas Furnaces and Appliances. The Johnson Gas Appliance Co., of Cedar Rapids, Ia., has issued a small, 23-page circular, describing and illustrating various styles of gas furnaces and appliances using forced air draft. The gas burners and appliances are useful for many purposes and are adapted for heating melting pots, candy, lard, soda and other caldrons, and for heat-treating, annealing and tempering. There are also numerous styles of furnaces for metal melting, soldering, stenciling, heat treating, annealing and case-hardening of carbon steel tools and parts. The pamphlet offers a list of heat colors and a table of melting points for use in the melting, treating and soldering of metal.

Information concerning appliances for the treating of metal may be addressed to the firm at Cedar Rapids, Ia.

Issue New Catalog. The Adjustable Clamp Company of Chicago have just issued their Catalog No. 5 of "Jorgensen" clamps and clamp fixtures. One of the special features of the "Jorgensen" is its adjustability which results in economy and efficiency, both in the school manual training shops as well as in industry. The catalog contains illustrations and descriptions of the Peerless adjustable hand screw, the steel spindle hand screw, "Pony" combination cabinet clamp and press screws, "Little Giant" clamp fixtures and press screws, tempered spring steel bar clamp, and malleable clamp fixtures.

Motion Picture on Sugar Refining. The American Sugar Refining Company of New York City has announced the completion of a two-reel motion picture illustrating sugar production and cane sugar refining. The pictures represent important phases of the sugar industry and should prove helpful in connection with the study of commercial geography. Teachers or supervisors desiring these pictures should address the firm at 117 Wall St., at least one week to ten days in advance of the date for which the films are intended.